PART-A

Unit-I: FOURIER SERIES

Convergence and divergence of infinite series of positive terms, definition and illustrative examples*
Periodic functions, Dirichlet’s conditions, Fourier series of periodic functions of period \(2\pi\) and arbitrary period, half range Fourier series. Complex form of Fourier Series. Practical harmonic analysis. [7 hours]

Unit-II: FOURIER TRANSFORMS

Infinite Fourier transform, Fourier Sine and Cosine transforms, properties, Inverse transforms [6 hours]

Unit-III: APPLICATIONS OF PDE

Various possible solutions of one dimensional wave and heat equations, two dimensional Laplace’s equation by the method of separation of variables, Solution of all these equations with specified boundary conditions. D’Alembert’s solution of one dimensional wave equation. [6 hours]

Unit-IV: CURVE FITTING AND OPTIMIZATION

Curve fitting by the method of least squares- Fitting of curves of the form
\[ y = ax + b, \quad y = ax^2 + bx + c, \quad y = ae^{bx}, \quad y = ax^b \]

Optimization: Linear programming, mathematical formulation of linear programming problem (LPP), Graphical method and simplex method.

[7 hours]

**PART-B**

**Unit-V: NUMERICAL METHODS - 1**


[6 hours]

**Unit-VI: NUMERICAL METHODS – 2**

Finite differences: Forward and backward differences, Newton’s forward and backward interpolation formulae. Divided differences - Newton’s divided difference formula, Lagrange’s interpolation formula and inverse interpolation formula.

Numerical integration: Simpson’s one-third, three-eighth and Weddle’s rules (All formulae/rules without proof)

[7 hours]

**Unit-VII: NUMERICAL METHODS – 3**
Numerical solutions of PDE – finite difference approximation to derivatives, Numerical solution of two dimensional Laplace’s equation, one dimensional heat and wave equations

[7 hours]

Unit-VIII: DIFFERENCE EQUATIONS AND Z-TRANSFORMS

Difference equations: Basic definition; Z-transforms – definition, standard Z-transforms, damping rule, shifting rule, initial value and final value theorems. Inverse Z-transform. Application of Z-transforms to solve difference equations.

[6 hours]

Note: * In the case of illustrative examples, questions are not to be set.

Text Books:


Reference Book:


MATERIAL SCIENCE AND METALLURGY
PART – A

UNIT - 1

06 Hours

UNIT - 2
Mechanical Behaviour: Stress-strain diagram showing ductile and brittle behaviour of materials, linear and non linear elastic behaviour and properties, mechanical properties in plastic range, yield strength offset yield strength, ductility, ultimate tensile strength, toughness. Plastic deformation of single crystal by slip and twinning.

06 Hours

UNIT - 3
Fracture: Type I, Type II and Type III.
Creep: Description of the phenomenon with examples, three stages of creep, creep properties, stress relaxation.
Fatigue: Types of fatigue loading with examples, Mechanism of fatigue, fatigue properties, fatigue testing and S-N diagram.

07 Hours

UNIT - 4
Solidification: Mechanism of solidification, Homogenous and Heterogeneous nucleation, crystal growth, cast metal structures.
Phase Diagram I: Solid solutions Hume Rothary rule substitutional, and interstitial solid solutions, intermediate phases, Gibbs phase rule.

07 Hours

PART - B

UNIT - 5
Phase Diagram II: Construction of equilibrium diagrams involving complete and partial solubility, lever rule. Iron carbon equilibrium diagram description of phases, solidification of steels and cast irons, invariant reactions.
UNIT - 6
Heat treating of metals: TTT curves, continuous cooling curves, annealing and its types, normalizing, hardening, tempering, marquenching, austempering, hardenability, surface hardening methods like carburizing, cyaniding, nitriding, flame hardening and induction hardening, age hardening of aluminium-copper alloys.

UNIT - 7
Ferrous and non ferrous materials: Properties, Composition and uses of
• Grey cast iron, malleable iron, SG iron and steel
• Copper alloys-brasses and bronzes,
  Aluminium alloys-Al-Cu, Al-Si, Al-Zn alloys.

UNIT - 8
Composite Materials: Definition, classification, types of matrix materials & reinforcements, fundamentals of production of FRP's and MMC's advantages and application of composites.

TEXT BOOKS:

REFERENCE BOOKS:
2. Engineering Materials Science, W.C.Richards, PHI, 1965
3. Physical Metallurgy; Lakhtin, Mir Publications
4. Materials Science and Engineering, V.Raghavan, PHI, 2002
PART-A

UNIT-1

Standards of measurement: Definition and Objectives of metrology, Standards of length-International prototype meter, Imperial standard yard, Wave length standard, subdivision of standards, line and end standard, calibration of end bars (Numerical), Slip gauges, Wringing phenomena, Indian Standards (M-81, M-12), Numerical problems on building of slip gauges.

06 Hours

UNIT-2

System of Limits, Fits, Tolerance and Gauging: Definition of tolerance, Specification in assembly, Principle of interchangeability and selective assembly limits of size, Indian standards, concept of limits of size and tolerances, compound tolerances, accumulation of tolerances, definition of fits, types of fits and their designation (IS 919-1963), geometrical tolerance, positional-tolerances, hole basis system, shaft basis system, classification of gauges, brief concept of design of gauges (Taylor's principles), Wear allowance on gauges, Types of gauges-plain plug gauge, ring gauge, snap gauge, limit gauge and gauge materials.

07 Hours

UNIT-3

Comparators and Angular measurement: Introduction to comparators, characteristics, classification of comparators, mechanical comparators-Johnson Mikrokator, sigma comparators, dial indicator, optical comparators-principles, Zeiss ultra optimeter, electric and electronic comparators-principles, LVDT, pneumatic comparators, back pressure gauges, solex comparators. Angular measurements, bevel protractor, sine principle and use of sine bars, sine centre, use of angle gauges (numericals on building of angles), clinometers.

07 Hours

UNIT-4:

Interferometer and screw thread, gear measurement: Interferometer, interferometry, autocollimator. Optical flats. Terminology of screw threads, measurement of major diameter, minor diameter, pitch, angle and effective diameter of screw threads by 2-wire and 3-wire methods, best size
wire. Tool maker’s microscope, gear tooth terminology, use of gear tooth vernier caliper and micrometer.

06 Hours

PART-B

UNIT-5:
Measurements and measurement systems: Definition, significance of measurement, generalized measurement system, definitions and concept of accuracy, precision, calibration, threshold, sensitivity, hysteresis, repeatability, linearity, loading effect, system response-times delay. Errors in measurement, classification of errors. Transducers, transfer efficiency, primary and secondary transducers, electrical, mechanical, electronic transducers, advantages of each type transducers.

07 Hours

UNIT-6
Intermediate modifying and terminating devices: Mechanical systems, inherent problems, electrical intermediate modifying devices, input circuitry, ballast circuit, electronic amplifiers and telemetry. Terminating devices, mechanical, cathode ray oscilloscope, oscillographs, X-Y plotters.

06 Hours

UNIT-7

06 Hours

UNIT-8
Temperature and strain measurement: Resistance thermometers, thermocouple, law of thermocouple, materials used for construction, pyrometer, optical pyrometer. Strain measurements, strain gauge, preparation and mounting of strain gauges, gauge factor, methods of strain measurement.

07 Hours

TEXT BOOKS:
REFERENCE BOOKS:

BASIC THERMODYNAMICS
(Common to ME/IP/AU/IM/MA)

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PART-A

UNIT - 1
Fundamental Concepts & Definitions: Thermodynamics definition and scope, Microscopic and Macroscopic approaches. Some practical applications of engineering thermodynamic Systems, Characteristics of system boundary and control surface, examples. Thermodynamic properties; definition and units, intensive and extensive properties. Thermodynamic state, state point, state diagram, path and process, quasi-static process, cyclic and non-cyclic processes; Thermodynamic equilibrium; definition, mechanical equilibrium; diathermic wall, thermal equilibrium, chemical equilibrium, Zeroth law of thermodynamics, Temperature; concepts, scales, fixed points and measurements.

06 Hours

UNIT - 2
Work and Heat: Mechanics, definition of work and its limitations. Thermodynamic definition of work; examples, sign convention. Displacement work; as a part of a system boundary, as a whole of a system boundary, expressions for displacement work in various processes through p-v diagrams. Shaft work; Electrical work. Other types of work. Heat; definition, units and sign convention.

06 Hours

UNIT - 3
First Law of Thermodynamics: Joules experiments, equivalence of heat and work. Statement of the First law of thermodynamics, extension of the First law to non-cyclic processes, energy, energy as a property, modes of energy, pure substance; definition, two-property rule, Specific heat at constant volume, enthalpy, specific heat at constant pressure. Extension of the First law to control volume; steady state-steady flow energy equation, important applications, analysis of unsteady processes such as film and evacuation of vessels with and without heat transfer.

07 Hours

UNIT - 4
Second Law of Thermodynamics: Devices converting heat to work; (a) in a thermodynamic cycle, (b) in a mechanical cycle. Thermal reservoir. Direct heat engine; schematic representation and efficiency. Devices converting work to heat in a thermodynamic cycle; reversed heat engine, schematic representation, coefficients of performance. Kelvin - Planck statement of the Second law of Thermodynamics; PMM I and PMM II, Clausius statement of Second law of Thermodynamics,Equivalence of the two statements; Reversible and irreversible processes; factors that make a process irreversible, reversible heat engines, Carnot cycle, Carnot principles.

07 Hours

PART-B

UNIT - 5
Entropy: Clasius inequality; Statement, proof, application to a reversible cycle. Entropy; definition, a property, change of entropy, principle of increase in entropy, entropy as a quantitative test for irreversibility, calculation of entropy using Tds relations, entropy as a coordinate. Available and unavailable energy.

06 Hours

UNIT - 6
Pure Substances: P-T and P-V diagrams, triple point and critical points. Sub-cooled liquid, saturated liquid, mixture of saturated liquid and vapour, saturated vapour and superheated vapour states of pure substance with water as example. Enthalpy of change of phase (Latent heat). Dryness fraction (quality), T-S and H-S diagrams, representation of various processes on these diagrams. Steam tables and its use. Throttling calorimeter, separating and throttling calorimeter.

07 Hours
UNIT - 7
Thermodynamic relations: Maxwell relation, Clausius Clayperon's equation. Ideal gas; equation of state, internal energy and enthalpy as functions of temperature only, universal and particular gas constants, specific heats, perfect and semi-perfect gases. Evaluation of heat, work, change in internal energy, enthalpy and entropy in various quasi-static processes.

07 Hours

UNIT - 8
Ideal gas mixture: Ideal gas mixture; Dalton's laws of partial pressures, Amagat's law of additive volumes, evaluation of properties, Analysis of various processes. Real Gases: Introduction. Van-der Waal's Equation of state, Van-der Waal's constants in terms of critical properties, Law of corresponding states, compressibility factor; compressibility chart

06 Hours

Data Handbooks:

TEXT BOOKS:

REFERENCE BOOKS:
4. An Introduction to Thermodynamics, Y.V.C.Rao, Wiley Eastern, 1993,
5. B.K Venkanna, Swati B. Wadavadagi “Basic Thermodynamics, PHI, New Delhi, 2010

MECHANICS OF MATERIALS
Subject Code : 10ME34 IA Marks : 25
Hours/Week : 04 Exam Hours : 03
Total Hours : 52 Exam Marks : 100
PART-A

UNIT 1:
Simple Stress and Strain: Introduction, Stress, strain, mechanical properties of materials, Linear elasticity, Hooke's Law and Poisson's ratio, Stress-Strain relation - behaviour in tension for Mild steel, cast iron and non ferrous metals. Extension / Shortening of a bar, bars with cross sections varying in steps, bars with continuously varying cross sections (circular and rectangular), Elongation due to self weight, Principle of super position.

07 Hours

UNIT 2:
Stress in Composite Section: Volumetric strain, expression for volumetric strain, elastic constants, simple shear stress, shear strain, temperature stresses (including compound bars).

06 Hours

UNIT 3:
Compound Stresses: Introduction, Plane stress, stresses on inclined sections, principal stresses and maximum shear stresses, Mohr's circle for plane stress.

07 Hours

UNIT 4:
Thick and Thin Cylinder Stresses in thin cylinders, changes in dimensions of cylinder (diameter, length and volume). Thick cylinders Lame’s equation (compound cylinders not included).

06 Hours

PART-B

UNIT 5:
Bending Moment and Shear Force in Beams: Introduction, Types of beams, loads and reactions, shear forces and bending moments, rate of loading, sign conventions, relationship between shear force and bending moments. Shear force and bending moment diagrams for different beams
subjected to concentrated loads, uniformly distributed load, (UDL) uniformly varying load (UVL) and couple for different types of beams.

UNIT 6:

UNIT 7:

UNIT 8:
Columns: Euler's theory for axially loaded elastic long columns. Derivation of Euler's load for various end conditions, limitations of Euler's theory, Rankine's formula.

TEXT BOOKS:

REFERENCE BOOKS:
CASTING PROCESS

UNIT - 1


Patterns: Definition, functions, Materials used for pattern, various pattern allowances and their importance. Classification of patterns, BIS color coding of Patterns.

Binder: Definition, Types of binder used in moulding sand.

Additives: Need, Types of additives used and their properties.

06 Hours

UNIT - 2

Sand Moulding: Types of base sand, requirement of base sand. Moulding sand mixture ingredients for different sand mixtures. Method used for sand moulding, such as Green sand, dry sand and skin dried moulds.

Cores: Definition, Need, Types. Method of making cores, Binders used, core sand moulding.

Concept of Gating & Risers. Principle and types.
Fettling and cleaning of castings. Basic steps, Casting defects, Causes, features and remedies.

**Moulding Machines**: Jolt type, Squeeze type, Jolt & Squeeze type and Sand slinger.

07 Hours

UNIT - 3

**Special moulding Process**: Study of important moulding processes, No bake moulds, Flaskless moulds, Sweep mould, CO₂ mould, Shell mould, Investment mould.

**Metal moulds**: Gravity die-casting, Pressure die casting, Centrifugal casting, Squeeze Casting, Slush casting, Thixo-casting and Continuous Casting Processes.

07 Hours

UNIT - 4

**Melting Furnaces**: Classification of furnaces. Constructional features & working principle of coke fired, oil fired and Gas fired pit furnace, Resistance furnace, Coreless Induction furnace, Electric Arc Furnace, Cupola furnace.

06 Hours

PART – B

**WELDING**

UNIT - 5

**Welding process**: Definition, Principles, Classification, Application, Advantages & limitations of welding.

**Arc Welding**: Principle, Metal Arc welding (MAW), Flux Shielded Metal Arc Welding (FSMAW), Inert Gas Welding (TIG & MIG) Submerged Arc Welding (SAW) and Atomic Hydrogen Welding processes. (AHW)


07 Hours

UNIT - 6

**Special types of welding**: Resistance welding - principles, Seam welding, Butt welding, Spot welding and projection welding.

Friction welding, Explosive welding, Thermit welding, Laser welding and Electron beam welding.

07 Hours
UNIT - 7

06 Hours

UNIT - 8

06 Hours

TEXT BOOKS:

REFERENCE BOOKS:

COMPUTER AIDED MACHINE DRAWING
Subject Code : 10ME36A/10ME46A IA Marks : 25

15
Hours/Week : 04 (1 Hrs. Theory & 3 Hrs Practical)  Exam Hours : 03
Total Hours : 52  Exam Marks : 100

Introduction:

02 Hours

PART-A

UNIT - 1
Sections of Solids: Sections of Pyramids, Prisms, Cubes, Tetrahedrons, Cones and Cylinders resting only on their bases (No problems on axis inclinations, spheres and hollow solids). True shape of sections.
Orthographic Views: Conversion of pictorial views into orthographic projections of simple machine parts with or without section. (Bureau of Indian Standards conventions are to be followed for the drawings) Hidden line conventions. Precedence of lines.

08 Hours

UNIT - 2
Fasteners: Hexagonal headed bolt and nut with washer (assembly), square headed bolt and nut with washer (assembly) simple assembly using stud bolts with nut and lock nut. Flanged nut, slotted nut, taper and split pin for locking, counter sunk head screw, grub screw, Allen screw.

08 Hours

PART-B

UNIT - 3
Keys & Joints:
Parallel key, Taper key, Feather key, Gibhead key and Woodruff key
Riveted Joints: Single and double riveted lap joints, butt joints with single/double cover straps (Chain and Zigzag, using snap head rivets). cotter joint (socket and spigot), knuckle joint (pin joint) for two rods.

08 Hours
UNIT - 4
Couplings:
Split Muff coupling, Protected type flanged coupling, pin (bush) type flexible
coupling, Oldham's coupling and universal coupling (Hooks' Joint)

08 Hours

PART - C
Assembly Drawings
(Part drawings should be given)
1. Plummer block (Pedestal Bearing)
2. Rams Bottom Safety Valve
3. I.C. Engine connecting rod
4. Screw jack (Bottle type)
5. Tailstock of lathe
6. Machine vice
7. Tool Head of a shaper

18 Hours

TEXT BOOKS:
1. 'A Primer on Computer Aided Machine Drawing-2007', Published by
   VTU, Belgaum.
2. 'Machine Drawing', N.D.Bhat & V.M.Panchal

REFERENCE BOOKS:
1. 'A Text Book of Computer Aided Machine Drawing', S. Trymbaka
   Murthy, CBS Publishers, New Delhi, 2007
3. 'Machine Drawing with Auto CAD', Goutam Pohit & Goutham Ghosh,
   1st Indian print Pearson Education, 2005
4. 'Auto CAD 2006, for engineers and designers', Sham Tickoo. Dream
   tech 2005
5. 'Machine Drawing', N. Siddeshwar, P. Kanniah, V.V.S. Sastri,
   published by Tata McGraw Hill, 2006

NOTE:
Internal assessment: 25 Marks
All the sheets should be drawn in the class using software. Sheet sizes should
be A3/A4. All sheets must be submitted at the end of the class by taking
printouts.

Scheme of Examination:
Two questions to be set from each Part-A, Part-B and Part-C
Student has to answer one question each from Part-A and Part-B for 20 marks each. And one question from Part-C for 60 marks.

\[
\text{i.e. } \begin{align*}
\text{PART-A } 1 \times 20 &= 20 \text{ Marks} \\
\text{PART-B } 1 \times 20 &= 20 \text{ Marks} \\
\text{PART-C } 1 \times 60 &= 60 \text{ Marks}
\end{align*}
\]
\[
\text{Total } = 100 \text{ Marks}
\]

**FLUID MECHANICS**

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**PART – A**

**UNIT-1**

Properties of Fluids: Introduction, Types of fluid, Properties of fluids, viscosity, thermodynamic properties, surface tension, capillarity, vapour pressure and cavitation

06 Hours

**UNIT-2**

Fluid Statistics: Fluid pressure at a point, Pascal's law, pressure variation in a static fluid, absolute, gauge, atmospheric and vacuum pressures, simple manometers and differential manometers. Total pressure and center of pressure on submerged plane surfaces; horizontal, vertical and inclined plane surfaces, curved surface submerged in liquid.

07 Hours

**UNIT-3**

Buoyancy and Fluid Kinematics:

Buoyancy, center of buoyancy, metacentre and metacentric height, conditions of equilibrium of floating and submerged bodies, determination of Metacentric height experimentally and theoretically.

Kinematics: Types of fluid flow, continuity equation in 2D and 3D (Cartesian Co-ordinates only), velocity and acceleration, velocity potential function and stream function.

07 Hours

**UNIT-4**
Fluid Dynamics: Introduction equation of motion, Euler’s equation of motion, Bernoulli’s equation from first principles and also from Euler’s equation, limitations of Bernoulli’s equation.  

PART-B

UNIT-5
Dimensional Analysis: Introduction, derived quantities, dimensions of physical quantities, dimensional homogeneity, Rayleigh’s method, Buckingham $\pi$ theorem, dimensionless numbers, similitude, types of similitudes.  

UNIT-6
Flow through pipes: Minor losses through pipes. Darey’s and Chezy’s equation for loss of head due to friction in pipes. HGL and TEL.  

UNIT-7
Laminar flow and viscous effects: Reynold’s number, critical Reynold’s number, laminar flow through circular pipe-Hagen Poiseille’s equation, laminar flow between parallel and stationary plates.  

UNIT-8
Flow past immersed bodies: Drag, Lift, expression for lift and drag, boundary layer concept, displacement, momentum and energy thickness. 
Introduction to compressible flow: Velocity of sound in a fluid, Mach number, Mach cone, propagation of pressure waves in a compressible fluid.  

TEXT BOOKS:

REFERENCE BOOKS:

19
4. **Fluid Mechanics and Fluid Power Engineering**, Kumar D.S, Kataria and Sons., 2004

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**METALLOGRAPHY AND MATERIAL TESTING LABORATORY**

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</table>

**PART – A**

3. To study the wear characteristics of ferrous, non-ferrous and composite materials for different parameters.
4. Non-destructive test experiments like,
   (a). Ultrasonic flaw detection
   (b). Magnetic crack detection
   (c). Dye penetration testing. To study the defects of Cast and Welded specimens

**PART – B**

1. Tensile, shear and compression tests of metallic and non metallic specimens using Universal Testing Machine
2. Torsion Test
3. Bending Test on metallic and nonmetallic specimens.
6. Fatigue Test.
MECHANICAL MEASUREMENTS AND METROLOGY
LABORATORY

Subject Code : 10MEL37B / 47B        IA Marks : 25
Hours/Week    : 03        Exam Marks : 50
Total Hours   : 48

PART-A: MECHANICAL MEASUREMENTS

1. Calibration of Pressure Gauge
2. Calibration of Thermocouple
3. Calibration of LVDT
4. Calibration of Load cell
5. Determination of modulus of elasticity of a mild steel specimen using strain gauges.

PART-B: METROLOGY

1. Measurements using Optical Projector / Toolmaker Microscope.
2. Measurement of angle using Sine Center / Sine bar / bevel protractor
3. Measurement of alignment using Autocollimator / Roller set
4. Measurement of cutting tool forces using
   a) Lathe tool Dynamometer
   b) Drill tool Dynamometer.
5. Measurement of Screw thread Parameters using Two wire or Three-wire method.
6. Measurements of Surface roughness, Using Tally Surf/Mechanical Comparator
7. Measurement of gear tooth profile using gear tooth vernier / Gear tooth micrometer
8. Calibration of Micrometer using slip gauges
9. Measurement using Optical Flats
Scheme of Examination:

ONE question from part -A: 20 Marks
ONE question from part -B: 20 Marks
Viva -Voice: 10 Marks

Total: 50 Marks

FOUNDARY AND FORGING LABORATORY

Subject Code: 10MEL38A / 48A  IA Marks: 25
Hours/Week: 03  Exam Hours: 03
Total Hours: 48  Exam Marks: 50

PART – A

1. Testing of Moulding sand and Core sand
Preparation of sand specimens and conduction of the following tests:
1  Compression, Shear and Tensile tests on Universal Sand Testing Machine.
2  Permeability test
3  Core hardness & Mould hardness tests.
4  Sieve Analysis to find Grain Fineness number of Base Sand
5  Clay content determination in Base Sand

PART – B

2. Foundry Practice
Use of foundry tools and other equipments.
Preparation of moulds using two moulding boxes using patterns or without patterns. (Split pattern, Match plate pattern and Core boxes).
Preparation of one casting (Aluminum or cast iron-Demonstration only)

PART – C
3. **Forging Operations**:
   - Calculation of length of the raw material required to do the model.
   - Preparing minimum three forged models involving upsetting, drawing and bending operations.
   - Out of these three models, at least one model is to be prepared by using Power Hammer.

**Scheme of Examination:**

One question is to be set from Part-A: 10 marks
One question is to be set from either Part-B or Part-C: 30 marks
Calculation part in case of forging is made compulsory

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<th>05 + 25 = 30 Marks</th>
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(Forging) Model

Calculation + Forging = 05 + 25 = 30 Marks

(Forging) Model

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**MACHINE SHOP**

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<td>Exam Marks</td>
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**PART – A**

23
Preparation of three models on lathe involving Plain turning, Taper turning, Step turning, Thread cutting, Facing, Knurling, Drilling, Boring, Internal Thread cutting and Eccentric turning.

PART – B


Scheme of Examination:

<table>
<thead>
<tr>
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<th>Marks</th>
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<tr>
<td>ONE question from part -A</td>
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<tr>
<td>ONE question from part -B</td>
<td>10 Marks</td>
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<tr>
<td>Viva -Voice</td>
<td>10 Marks</td>
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Total : 50 Marks
ENGINEERING MATHEMATICS – IV

PART-A

Unit-I: NUMERICAL METHODS - 1

Numerical solution of ordinary differential equations of first order and first degree; Picard’s method, Taylor’s series method, modified Euler’s method, Runge-Kutta method of fourth-order. Milne’s and Adams - Bashforth predictor and corrector methods (No derivations of formulae).

[6 hours]

Unit-II: NUMERICAL METHODS – 2


[6 hours]

Unit-III: Complex variables – 1

Function of a complex variable, Analytic functions-Cauchy-Riemann equations in cartesian and polar forms. Properties of analytic functions.
Application to flow problems- complex potential, velocity potential, equipotential lines, stream functions, stream lines.

[7 hours]

Unit-IV: Complex variables – 2

Conformal Transformations: Bilinear Transformations. Discussion of Transformations:

\[ w = z^2, \quad w = e^z, \quad w = z + (a^2 / z). \]

Complex line integrals- Cauchy’s theorem and Cauchy’s integral formula.

[7 hours]

PART-B

Unit-V: SPECIAL FUNCTIONS

Solution of Laplace equation in cylindrical and spherical systems leading Bessel’s and Legendre’s differential equations, Series solution of Bessel’s differential equation leading to Bessel function of first kind. Orthogonal property of Bessel functions. Series solution of Legendre’s differential equation leading to Legendre polynomials, Rodrigue’s formula.

[7 hours]

Unit-VI: PROBABILITY THEORY - 1

Probability of an event, empirical and axiomatic definition, probability associated with set theory, addition law, conditional probability, multiplication law, Baye’s theorem.

[6 hours]
Unit-VII: PROBABILITY THEORY- 2

Random variables (discrete and continuous), probability density function, cumulative density function. Probability distributions – Binomial and Poisson distributions; Exponential and normal distributions.

[7 hours]

Unit-VIII: SAMPLING THEORY

Sampling, Sampling distributions, standard error, test of hypothesis for means, confidence limits for means, student’s t-distribution. Chi -Square distribution as a test of goodness of fit

[6 hours]

Text Books:


Reference Book:
PART-A

UNIT - 1

07 Hours

UNIT- 2

06 Hours

UNIT - 3

06 Hours

UNIT - 4
Vapour Power Cycles: Carnot vapour power cycles, drawbacks as a reference cycle, Simple Rankine cycle, description, T- S diagram, analysis

07 Hours

PART-B

UNIT - 5
Reciprocating Compressors: Operation of a single stage reciprocating compressors, work input through P-V diagram and steady state steady flow analysis. Effect of clearance and volumetric efficiency. Adiabatic, isothermal and mechanical efficiencies. Multistage compressor, saving in work, optimum intermediate pressure, inter-cooling, minimum work for compression.

06 Hours

UNIT - 6

07 Hours

UNIT - 7
Refrigeration: Vapour compression refrigeration system; description, analysis, refrigerating effect, capacity, power required, units of refrigeration, COP, Refrigerants and their desirable properties. Air cycle refrigeration; reversed Carnot cycle, reversed Brayton cycle, Vapour absorption refrigeration system, steam jet refrigeration.

06 Hours

UNIT - 8
Psychometry: Atmospheric air and psychometric properties; Dry bulb temperature, wet bulb temperature, dew point temperature; partial pressures, specific and relative humidities and the relation between the two enthalpy and adiabatic saturation temperature. Construction and use of psychometric chart. Analysis of various processes; heating, cooling, dehumidifying and humidifying. Adiabatic mixing of moist air. Summer and winter air conditioning.

07 Hours

Data Hand Book:
2. **Properties of Refrigerant & Psychometric** (tables & Charts in SI Units), Dr. S.S. Banwait, Dr. S.C. Laroiya, Birla Pub. Pvt. Ltd., Delhi, 2008

**TEXT BOOKS:**
2. **Applied Thermodynamics**, Rajput, Laxmi Publication

**REFERENCE BOOKS:**

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**KINEMATICS OF MACHINES**

<table>
<thead>
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<th>Exam Hours</th>
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**PART – A**

**UNIT - 1**
**Introduction**: Definitions Link or element, kinematic pairs, Degrees of freedom, Grubler's criterion (without derivation), Kinematic chain, Mechanism, Structure, Mobility of Mechanism, Inversion, Machine.

**Kinematic Chains and Inversions**: Inversions of Four bar chain; Single slider crank chain and Double slider crank chain.

07 Hours

**UNIT - 2**
**Mechanisms**: Quick return motion mechanisms-Drag link mechanism, Whitworth mechanism and Crank and slotted lever Mechanism.

30
Straight line motion mechanisms Peaucellier's mechanism and Robert's mechanism. Intermittent Motion mechanisms - Geneva wheel mechanism and Ratchet and Pawl mechanism. Toggle mechanism, Pantograph, Ackerman steering gear mechanism.

06 Hours

UNIT - 3
Velocity and Acceleration Analysis of Mechanisms (Graphical Methods)
Velocity and acceleration analysis of Four Bar mechanism, slider crank mechanism and Simple Mechanisms by vector polygons: Relative velocity and acceleration of particles in a common link, relative velocity and accelerations of coincident Particles on separate links - Coriolis component of acceleration. Angular velocity and angular acceleration of links, velocity of rubbing.

07 Hours

UNIT - 4
Velocity Analysis by Instantaneous Center Method: Definition, Kennedy's Theorem, Determination of linear and angular velocity using instantaneous center method
Klein's Construction: Analysis of velocity and acceleration of single slider crank mechanism.

06 Hours

PART – B

UNIT - 5
Velocity and Acceleration Analysis of Mechanisms (Analytical Methods):
Analysis of four bar chain and slider crank chain using analytical expressions. (Use of complex algebra and vector algebra)

06 Hours

UNIT - 6
Spur Gears: Gear terminology, law of gearing, Characteristics of involute action, Path of contact. Arc of contact, Contact ratio of spur, helical, bevel and worm gears, Interference in involute gears. Methods of avoiding interference, Backlash. Comparison of involute and cycloidal teeth. Profile Modification.

07 Hours

UNIT - 7
UNIT - 8
Cams: Types of cams, Types of followers. Displacement, Velocity and, Acceleration time curves for cam profiles. Disc cam with reciprocating follower having knife-edge, roller and flat-face follower, Disc cam with oscillating roller follower. Follower motions including SHM, Uniform velocity, uniform acceleration and retardation and Cycloidal motion.

TEXT BOOKS:

REFERENCE BOOKS:

Graphical Solutions may be obtained either on the Graph Sheets or on the Answer Book itself.

MANUFACTURING PROCESS – II
(Metal Removing Process)

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PART – A

UNIT - 1

07 Hours
UNIT - 2

07 Hours

UNIT - 3
Turning (Lathe), Shaping and Planing Machines: Classification, constructional features of Turret and Capstan Lathe. Tool Layout, shaping Machine, Planing Machine, Driving mechanisms of lathe, shaping and planing machines, Different operations on lathe, shaping machine and planing machine. Simple problems on machining time calculations

07 Hours

UNIT - 4

06 Hours

PART – B

UNIT - 5
Milling machines: Classification, constructional features, milling cutters nomenclature, milling operations, up milling and down milling concepts. Various milling operations. Indexing: Simple, compound, differential and angular indexing calculations. Simple problems on simple and compound indexing.

06 Hours

UNIT - 6

07 Hours
UNIT - 7:
Finishing and other Processes Lapping and Honing operations – Principles, arrangement of set up and application. Super finishing process, polishing, buffing operation and application.  

06 Hours

UNIT - 8
Non-traditional machining processes: Need for non traditional machining, Principle, equipment & operation of Laser Beam, Plasma Arc Machining, Electro Chemical Machining, Ultrasonic Machining, Abrasive Jet Machining, Water Jet Machining, Electron Beam Machining, Electron Discharge Machining and Plasma Arc Machining. 

06 Hours

TEXT BOOKS:

REFERENCE BOOKS:

V SEMESTER
MANAGEMENT & ENTREPRENEURSHIP

<table>
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<th>Subject Code</th>
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34
Total No. of Lecture Hrs. : 52 Exam Marks : 100

PART – A

MANAGEMENT

UNIT - 1

7 Hours

UNIT - 2

6 Hours

UNIT - 3

6 Hours

UNIT - 4

7 Hours

PART – B

ENTREPRENEURSHIP

UNIT - 5
ENTREPRENEUR: Meaning of Entrepreneur; Evolution of the Concept, Functions of an Entrepreneur, Entrepreneur - an emerging Class, Concept of Entrepreneurship – Evolution of Entrepreneurship; Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

6 Hours

UNIT - 6
SMALL SCALE INDUSTRIES: Definition; Characteristics; Need and rationale; Objectives; Scope; role of SSI in Economic Development. Advantages of SSI Steps to start and SSI – Government policy towards SSI; Different Policies of SSI; Government Support for SSI during 5 year plans. Impact of Liberalization, Privatization, Globalization on SSI Effect of WTO/GATT Supporting Agencies of Government for SSI, Meaning, Nature of support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition Only) 

UNIT - 7
INSTITUTIONAL SUPPORT: Different Schemes; TECKSOK; KIADB; KSSIDC; KSIMC; DIC Single Window Agency; SISI; NSIC; SIDBI; KSFC.

UNIT - 8
PREPARATION OF PROJECT: Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; Formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal. Identification of business opportunities: Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study.

TEXT BOOKS:

REFERENCE BOOKS:

ENGINEERING ECONOMY

Subject Code : 10IP /IM 52 IA Marks : 25
No. of Lecture Hrs./ Week : 04 Exam Hours : 03

36
PART - A

UNIT - 1
INTRODUCTION: Engineering Decision- Makers, Engineering and Economics, Problem solving and Decision making, Intuition and Analysis, Tactics and Strategy

UNIT - 2
INTEREST AND INTEREST FACTORS: Interest rate, simple interest, Compound interest, Cash- flow diagrams, Exercises and Discussion.

UNIT - 3

UNIT - 4
EQUIVALENT ANNUAL WORTH COMPARISONS: Equivalent Annual Worth Comparison methods, Situations for Equivalent Annual Worth Comparison, Consideration of asset life, Comparison of assets with equal and unequal lives, Use of sinking fund method, Annuity contract for guaranteed income, Exercises, Problems.

UNIT - 5
RATE OF RETURN CALCULATIONS: Rate of return, Minimum acceptable rate of return, IRR, IRR misconceptions, Cost of capital concepts, replacement models.

UNIT - 6
DEPRECIATION: Causes of Depreciation, Basic methods of computing depreciation charges

ESTIMATING & COSTING: Components of costs such as Direct Material Cost, Direct Labour Cost, Fixed, Over – Heads, Factory Costs,
Administrative – Over Heads, First Cost, Marginal Cost, Selling price, Estimation for simple components

UNIT - 7
REPLACEMENT ANALYSIS: Introduction, reasons for replacement, Individual Replacement of machinery or equipment with/without value of money, Group Replacement Policies, Problems.

UNIT - 8
EFFECTS OF INFLATION: Causes, consequences and control of inflation. After tax actual cash flow comparisons, Lease/ Buy decisions

BREAK-EVEN ANALYSIS
Basic Concepts Linear & non-linear break even analysis.

TEXT BOOKS:

REFERENCE BOOKS:

WORK STUDY AND ERGONOMICS

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38
PART – A

UNIT - 1
PRODUCTIVITY: Definition of productivity, individual enterprises, task of management, Productivity of materials, land, building, machine and power. Measurement of productivity, factors affecting the productivity, productivity improvement programmes, wages and incentives (simple numerical problems)

7 Hours

UNIT - 2
WORK STUDY: Definition, objective and scope of work study. Human factor in work study. Work study and management, work study and supervision, work study and worker.

6 Hours

UNIT - 3
INTRODUCTION TO METHOD STUDY: Definition, objective and scope of method study, activity recording and exam aids. Charts to record movements in shop operation – process charts, flow diagram, flow process charts, travel chart and multiple activity charts. (With simple problems)

7 Hours

UNIT - 4
MICRO AND MEMO MOTION STUDY: Charts to record movements at work place – principles of motion economy, Therbligs and classification of movements, Two Handed process chart, SIMO chart, and micro motion study. Development, definition and installation of the improved method, brief concept about synthetic motion studies.

6 Hours

PART - B

UNIT - 5
INTRODUCTION TO WORK MEASUREMENT: Definition, objective and benefit of work measurement. Work measurement techniques: WORK SAMPLING, need, confidence levels, sample size determinations, random observation, conducting study with the simple problems.

6 Hours

UNIT - 6

PREDETERMINED MOTION TIME STUDY (PMTS)
METHOD TIME MEASUREMENT (MTM)  

UNIT - 7  

UNIT - 8  

TEXT BOOKS:  
1. Introduction to work study, ILO - III Revised Edition, 1981  

REFERENCES BOOKS:  

CAD/CAM  

Subject Code : 10IP /IM 54  IA Marks : 25
PART - A

UNIT - 1

FUNDAMENTALS OF CAD: Comparison of general design process and CAD process, Concept of manufacturing data base, general consideration of Hardware for a typical CAD system.  
7 Hours

UNIT - 2
7 Hours

UNIT - 3
INTRODUCTION TO FINITE ELEMENT ANALYSIS: Introduction, Basic Concepts, Discretization, Element types, Nodes & degrees of freedom, Mesh generation, Constraints, Loads, Preprocessing, Application to static analysis.  
6 Hours

UNIT - 4
NC, CNC, DNC TECHNOLOGIES: NC, CNC, DNC, Modes, NC Elements, Advantages and Limitations of NC, CNC, Functions of computers in DNC.  
CNC MACHINE TOOLS: CNC tooling, Turning tool geometry, Milling tooling system, Tool presetting, ATC, Work holding, Overview of different CNC machining centers, CNC Turning centers, High speed machine tools.  
7 Hours

PART - B

UNIT - 5
CNC PROGRAMMING: Part program fundamentals, Steps involved in development of a part program, Manual part programming, Milling & Turning Center Programming.  
7 Hours

UNIT - 6
APT PROGRAMMING: APT Programming in Drilling, Milling & Turning
UNIT - 7
INTRODUCTION TO ROBOTICS: Introduction, Robot configuration, Robot motions, End effectors, Work cell, Control & Interlock, Robot Sensor, Robot applications.

UNIT - 8
PROGRAMMING THE ROBOTS: Robot-Programming Languages, Introduction to different languages and writing the programming for palletising operation

TEXT BOOKS:

REFERENCE BOOKS:

DESIGN OF MACHINE ELEMENTS
PART - A

UNIT - 1
DESIGN FOR STATIC STRENGTH: Design considerations; Codes and Standards, static loads and factor of safety. Theories of failure: Maximum Normal Stress Theory, Maximum Shear Stress Theory, Distortion energy theory. Failure of Brittle and Ductile materials. Stress concentration. Determination of stress concentration factor. 7 Hours

UNIT - 2
DESIGN FOR FATIGUE STRENGTH: S – N Diagram, low cycle and High cycle fatigue. Endurance limit. Modifying factors: Load, Size and Surface finish effects. Fatigue stress concentration factor. Fluctuating stresses. Goodman and Soderberg Relationship. Stresses due combined loading, Cumulative fatigue damage. 6 Hours

UNIT - 3
KEYS, COUPLINGS, COTTER AND KNUCKLE JOINTS: Design of Keys, Design of rigid flange coupling, Bush and Pin type Flexible Coupling, Design of Cotter and Knuckle joints. 6 Hours

UNIT - 4
DESIGN OF SHAFTS: Design of shafts subjected to torsion, bending moment and combined torsion moment and axial loading. ASME and BIS Codes for design of transmission shafting. Design for strength and rigidity. Shafts under fluctuating loads and combined loads. 7 Hours

PART B

UNIT - 5
DESIGN OF GEARs: Introduction to Spur, Helical and Bevel Gears. Design of Spur gear, Lewis equation, form factor, stresses in gear tooth, Dynamic load and wear load. 6 Hours

UNIT - 6
RIVETED JOINTS AND WELDED JOINTS: Types of riveted joints, failures of riveted joints, Boiler joint, Efficiency.

Types of welded joints, Strength of butt and fillet welds, Eccentrically loaded welds. 7 Hours
UNIT - 7
DESIGN OF SPRINGS: Types of springs, Stresses in Coil springs of circular and non-circular cross-sections. Tension and compression springs. Stresses in Leaf springs.  

UNIT - 8

BALL AND ROLLER BEARINGS: Bearing life, Equivalent bearing load, Selection of Deep groove ball bearings.

TEXT BOOKS:


REFERENCE BOOKS:


STATISTICS FOR ENGINEERS
PART - A

UNIT - 1
THE ROLE OF STATISTICS IN ENGINEERING (DATA SUMMARY AND PRESENTATION): Statistical Thinking, Collecting data, Statistical Modelling Framework, measure of central tendency and variance, Importance of Data summary and Display, Tabular and Graphical display:

6 Hours

UNIT - 2

7 Hours

UNIT - 3
CONTINUOUS RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS: Continuous random variables, Probability distributions and probability density functions, cumulative distribution functions, Mean and Variance of a continuous random variable, uniform distribution, Normal distribution, Normal approximation to Binominal and Poisson distribution, Exponential distribution and their Applications.

7 Hours

UNIT - 4
ESTIMATION THEORY: Statistical Inference, Random sampling, Properties of Estimators, Sampling distribution, Sampling distribution of mean, variance and proportion. Introduction to confidence intervals.

6 Hours

PART - B

UNIT - 5
STATISTICAL INFERENCE FOR A SINGLE SAMPLE: Hypothesis testing, Inference on the mean of a population (variance known and unknown), Inference on the variance of a normal population, Inference on a population proportion.

7 Hours
UNIT - 6
STATISTICAL INFERENCE FOR A SINGLE SAMPLE AND TWO SAMPLES: Testing for Goodness of Fit, Inference for a difference in Means, Variances known, Inference for a difference in means of two normal distributions, Variances unknown, Inference on the Variances of two normal populations, Inference on two population proportions. 7 Hours

UNIT - 7
SIMPLE LINEAR REGRESSIONS AND CORRELATION: Simple Linear Regression, Properties of Least square Estimators and Estimation of variances, Common abuses of regression, Prediction of new observations, Assessing the adequacy of regression model, Transformations to a straight line, Introduction to multiple regression (no problems), Correlation. 6 Hours

UNIT - 8
DESIGN OF EXPERIMENTS: Strategy of experimentation, completely randomized single - factor experiment, Tests on individual treatment means, the random effects model, the randomized complete block design, one way analysis of variance and two way analysis of variance. 6 Hours

TEXT BOOKS:

REFERENCE BOOKS:

MECHANICAL LAB

46
PART - A

(Individual experiments)

Determination of Flash point and Fire point of lubricating oil using Abel Pensky Martins Apparatus
Determination of Calorific value of solid and gaseous fuels.
Determination of Viscosity of a lubricating oil using Redwoods and Say bolts – Viscometers.

PART - B

Group experiments

Performance Tests on Four stroke Petrol and Diesel Engines, Calculations of IP, BP, Thermal efficiencies, SFC, FP and heat balance sheet
Performance Test on Four stroke Petrol - Calculations of IP, BP, Thermal efficiencies, SFC. Multi cylinder petrol / diesel engine (Morse Test)
Calibration of Venturi meter, Flow through pipes
Performance test on centrifugal and reciprocating pumps

Note: A minimum of 12 exercises are to be conducted.

WORK STUDY AND ERGONOMICS LAB
Subject Code : 10IPL/IML 58  IA Marks : 25
No. of Lab Hrs./ Week : 03  Exam Hours : 03
Total No. of Lab Hrs. : 42  Exam Marks : 50

PART - A
METHOD STUDY
Recording Techniques: Preparing the following charts and diagrams (Minimum 3 Charts)
1. Outline process chart, Multiple Activity Chart
2. Flow process chart and Flow diagram, String diagram
3. Experiments on the Application of principle of motion economy
   Two handed process chart
4. SIMO chart
5. Exercises on conducting method study for assembling simple components and office work.
6. Development of Layout plans using SLP technique
7. Experiments on Line balancing. (demo only)

PART - B
WORK MEASUREMENT
1. Rating practice using: walking simulator, pin board assembly, dealing a deck of cards
2. and marble collection activity
3. Determining the standard time for simple operations using stopwatch time study
4. Exercises on estimating standard time using PMTS.
5. Measurement of parameters (heart beat rate, calorie consumption) using walking simulator
6. Measurement of parameters (heart beat rate, calorie consumption, revolutions per minute) using ergometer

Note: A minimum of 12 exercisers are to be conducted

REFERENCE BOOKS:

VI SEMESTER
MATERIALS MANAGEMENT

48
PART - A

UNIT - 1


6 Hours

UNIT - 2


6 Hours

UNIT - 3


8 Hours
UNIT- 4
PURCHASING AND PROCUREMENT Activities under Materials Management: Supplier Quality Assurance Programme, Buyer-Supplier Relationship.

INCOMING MATERIAL QUALITY CONTROL: Significance of Inspection, Purchase Inspection, Sampling Inspection, Sampling Technique, Different Types of Population, Different Types of Sampling, Risks of Sampling. SQC in Operation: A Work-site Problem Study.

6 Hours

PART - B
UNIT - 5
PURCHASING CAPITAL Equipment, Plant and Machinery: Responsibility and Decision, Purchasing v/s Leasing.


6 Hours

UNIT - 6
REGISTRATION of Firms, Procedure for Registration, Terms of Registration, Removal of the Firms from the List, Blacklisting of Firms, Banning of Firms, Suspension of Firms, Purchases of the Stores by the DGS&D - Surplus Disposals by the DGS&D, Pre-disposal Inspection of Surpluses.

Inventory Management and Control Systems: Definition of Inventories, The Need for Inventory Audits Control, Types of Inventories, Inventory Control, Max-Min System, Inventories and Demand Uncertainty, Determining Safety Stock.

7 Hours

UNIT – 7
INVENTORY MODELS: Deterministic Inventory Models with numerical examples, Q-system or Quantity Control System or Re-order Point System- Effect of Quantity Discounts, P-system or Periodic Review or Periodic Count System or Replenishment System, Optional Replenishment System or "S, s" Policy, ABC Inventory Classification (Selective Inventory Control - SIC). The Need for a Systems Approach, Materials Planning System (MPS)/Materials Requirement Planning (MRP), Basic Tool.

7 Hours

UNIT - 8


6 Hours

Text Book:


Reference Book:


QUALITY ASSURANCE AND RELIABILITY
PART - A

UNIT - 1
INTRODUCTION: Definition of Quality, Quality function, Dimensions of Quality, Quality Engineering terminology, Brief history of quality methodology, Statistical methods for quality improvement, Quality costs – four categories of costs and hidden costs. Brief discussion on sporadic and chronic quality problems. Introduction to Seven QC tools.

6 Hours

UNIT - 2
STATISTICAL PROCESS CONTROL: Introduction to statistical process control – chance and assignable causes for variation. Basic principles of control charts, choice of control limits, sample size and sampling frequency, rational subgroups. Analysis of patterns of control charts. Case Studies on application of SPC. Process capability – Basic definition, standardized formula, relation to product tolerance and six sigma concept of process capability.

6 Hours

UNIT – 3
PROBABILTY DISTRIBUTION – Hyper Geometric, Binomial, Poisson and Normal distribution.

CONTROL CHARTS FOR VARIABLES: Controls Charts for X Bar and Range (R), Statistical basis of the charts, Development and use of X bar and R charts, Interpretation of charts. Control charts for X bar and Standard Deviation (S), Development and use of X bar and S chart. Brief discussion on – Pre control X Bar and S control charts with Variable sample size, Control charts for individual measurements, cusum chart, Moving-range charts.

8 Hours

UNIT - 4
CONTROL CHARTS FOR ATTRIBUTES: Control chart for fraction non-conforming (defectives), development and operation of control chart, brief discussion on variable sample size.
Control chart for non-conformities (defects) – development and operation of control chart for constant sample size and variable sample size. Choice between variables and attributes control charts. Guidelines for implementing control charts.

7 Hours

PART - B

UNIT - 5

UNIT - 6
USE OF PUBLISHED SAMPLING PLANS: Gauge Repeatability & Reproducibility & Measurement system analysis.

STATISTICAL THEORY OF TOLERANCES: Application of statistical theory of tolerances to design tolerances in random assemblies and application in other areas.  

UNIT - 7
RELIABILITY AND LIFE TESTING: Failure models of components, definition of reliability, MTBF, Failure rate, common failure rate curve, types of failure, reliability evaluation in simple cases of exponential failures in series, parallel and series-parallel device configurations, Redundancy and improvement factors evaluation.  

UNIT - 8
QUALITY ASSURANCE: Definition and concept of quality assurance, departmental assurance activities. Quality audit concept, audit approach etc. structuring the audit program, planning and performing audit activities, audit reporting, ingredients of a quality program.  

TEXT BOOKS:


REFERENCE BOOKS:

PART - A

UNIT – 1
INTRODUCTION: OR Methodology, Definition of OR, Application of OR to Engineering and Managerial Problems, Features of OR models, Limitation of OR, Models of OR.

LINEAR PROGRAMMING: Definition, Mathematical formulation.  
6 Hours

UNIT-2
LINEAR PROGRAMMING Standard form, solution space, Solution – Feasible, basic feasible, Optimal, Infeasible, Multiple, Optimal, Redundancy, Degeneracy. Graphical Method  
6 Hours

UNIT -3
LINEAR PROGRAMMING: Simplex method, variants of simplex algorithm – Artificial basis techniques, Duality, Economic interpretation of Dual, Solution of LPP using duality concept, Dual simplex method.  
7 Hours

UNIT - 4
TRANSPORTATION PROBLEM: Formulation of transportation model, Basic feasible solution using different methods (North-West corner, Least Cost, Vogel’s Approximation Method) Optimality Methods, Unbalanced transportation problem, Degeneracy in transportation problems, Variants in Transportation Problems, Applications of Transportation problems.  
7 Hours

PART – B

UNIT - 5
ASSIGNMENT PROBLEM: Formulation of the Assignment problem, unbalanced assignment problem, travelling salesman problem  
6 Hours

UNIT - 6
QUEUING THEORY: Queuing system and their characteristics, The M/M/1 Queuing system, Steady state performance analysing of M/M/1 queuing model. M/M/K/ Model  
6 Hours

UNIT - 7
PROJECT MANAGEMENT USING NETWORK ANALYSIS: Network construction, determination of critical path and duration, CPM Structured approach, Calculations of schedules and floats, Network crashing. PERT- Estimation of project duration and variance.

UNIT -8
GAME THEORY: Formulations of games, Two person zero sum game, games with and without saddle point, graphical solutions (2xn, mx2 game), dominance property. Solution of game through LPP.

TEXT BOOKS:

REFERENCE BOOKS:

SIMULATION MODELLING AND ANALYSIS
PART - A

UNIT - 1
INTRODUCTION TO SIMULATION: Simulation, advantages & disadvantages, Areas of application, System environment, Components of a system, Model of a system, Types of models, Steps in a simulation study.  

6 Hours

UNIT - 2
SIMULATION EXAMPLES: Simulation of Queuing systems, Simulation of Inventory System, Other simulation examples. 

6 Hours

UNIT - 3

6 Hours

UNIT - 4
RANDOM NUMBERS: Properties, Generations methods, Tests for Random number- Frequency test, Runs test, Auto correlation test, Gap test, Poker test 

6 Hours

PART - B

UNIT - 5

7 Hours

UNIT - 6
ANALYSIS OF SIMULATION DATA: Input Modelling: Data collection, Identification and distribution with data, parameter estimation, Goodness of fit tests, Selection of input models without data, Multivariate and time series analysis

Verification and Validation of Model – Model Building, Verification, Calibration and Validation of Models. 

7 Hours

UNIT - 7

56
OUTPUT ANALYSIS: Stochastic Nature of output data, Measures of Performance and their estimation, Output analysis of terminating simulation, Output analysis of steady state simulations

UNIT - 8

OPTIMISATION VIA SIMULATION: Meaning, difficulty, Robust Heuristics, Random Search

APPLICATIONS
Simulation of Manufacturing and Material Handling Systems, Simulation of Computer Systems, Simulation of Plant Layout, Simulation of Project Management

SIMULATION SOFTWARES
Selection of Simulation Software, Simulation packages, Experiment and Statistical Analysis tool, Trend in Simulation Software

TEXT BOOKS:

REFERENCE BOOKS:

SOFTWARE ENGINEERING & MANAGEMENT
PART - A

UNIT - 1

UNIT - 2
SOFTWARE PROJECT MANAGEMENT CONCEPTS: The Management Specification, People, Problem, Process, project

UNIT - 3

UNIT - 4
RISK MANAGEMENT: Reactive vs Proactive Risk Strategies, Software Risks, Risk identification, Risk projection, Monitoring.

PART - B

UNIT - 5
SOFTWARE PROJECT SCHEDULING AND TRACKING: Basic concepts, defining a task set selection, Defining Scheduling, Project Plan

SOFTWARE QUALITY ASSURANCE: Quality assurance concept, Cost impact of software defects, Technical review, statistical Quality assurance, software reliability, ISO 9000 Quality standards.

UNIT - 6
UNIT - 7

UNIT - 8
SOFTWARE TESTING: Objectives, Principles, Testability

SOFTWARE QUALITY AND RELIABILITY: Introduction, Software failure modes, software structure and modularity, language, Data reliability, Fault tolerance, software checking and software testing.

OBJECT ORIENTED CONCEPT AND PRINCIPLES: Object Oriented Concepts, Identifying the elements of an object model, Examples.

TEXT BOOK:

REFERENCE BOOKS:

CAD/CAM LAB
PART - A

Modelling of simple machine parts using Graphics Package.

Study of Finite Element Analysis Package - 1D, 2D, Structural problems, Evaluation of displacement (Strain) and Stress. Problems involving Beams and Trusses.

PART - B

Modelling and Simulation of Machining process of simple machine parts using CAM packages.

Suggested Software Packages: Solid Works/ Uni Graphics/Catia and MASTER CAM or any other similar packages.

Note: A minimum of 12 exercises are to be conducted.

SIMULATION LAB
PART - A

Introduction to Simulation Packages
Understanding the Simulation Package
Identifying probability distributions for given data
Building simulation models for manufacturing operations (Electronic assembly – With Basic templates)
Building simulation models for manufacturing operations (Electronic assembly – With Common templates)
Building simulation models for manufacturing operations with transport System
Building simulation models for manufacturing operations with layout

PART - B

Building simulation models for manufacturing operations with layout and transport System
Building simulation Models for Banking service (Bank teller problem)
Building simulation Models for Mortgage application problem
Building simulation Models for food processing problem
Building simulation Models for Post office animation
Statistical Analysis of Simulation models (input analysis)
Statistical Analysis of Simulation models (output analysis)

Suggested Software Packages: Promodel/Arena/Quest/Witness/Extend.

Note: A minimum of 12 exercises are to be conducted.

Elective I (Group – A)
UNIT - 1
INTRODUCTION TO VALUE ANALYSIS: Definition of Value, Value Analysis, Value Engineering, Value management, Value Analysis versus Value Engineering, Value Analysis versus Traditional cost reduction techniques, uses, applications, advantages and limitations of Value analysis. Symptoms to apply value analysis, Coaching of Champion concept.

6 Hours

UNIT - 2
TYPE OF VALUES: Reasons for unnecessary cost of product, Peeling cost Onion concept, unsuspected areas responsible for higher cost, Value Analysis Zone, attractive features of value analysis. Meaning of Value, types of value & their effect in cost reduction. Value analysis procedure by simulation. Detailed case studies of simple products.

7 Hours

UNIT - 3

7 Hours

UNIT - 4
PROBLEM SETTING & SOLVING SYSTEM: A problem solvable stated is half solved, Steps in problem setting system, Identification, Separation and Grouping of functions. Case studies.

6 Hours

PART - B

UNIT - 5
VALUE ENGINEERING JOB PLAN: Meaning and Importance of Value Engineering Job plan. Phases of job plan proposed by different value engineering experts, Information phase, Analysis phase, Creative phase,
Judgement phase, Development planning phase, and case studies. Cost reduction programs, criteria for cost reduction program, Value analysis change proposal.  

**UNIT - 6**  
**VALUE ENGINEERING TECHNIQUES:** Result Accelerators or New Value Engineering Techniques, Listing. Role of techniques in Value Engineering. Details with Case examples for each of the Techniques.  

**6 Hours**

**UNIT - 7**  
**ADVANCED VALUE ANALYSIS TECHNIQUES:** Functional analysis system technique and case studies, Value Analysis of Management Practice (VAMP), steps involved in VAMP, application of VAMP to Government, University, College, Hospitals, School Problems etc., (service type problems).

**TOTAL VALUE ENGINEERING:** Concepts, need, methodology and benefits.  

**8 Hours**

**UNIT - 8**  
**APPLICATION OF VALUE ANALYSIS:** Application of Value analysis in the field of Accounting, Appearance Design, Cost reduction, Engineering, manufacturing, Management, Purchasing, Quality Control, Sales, marketing, Material Management Etc., Comparison of approach of Value analysis & other management techniques.  

**6 Hours**

**TEXT BOOKS:**


**REFERENCE BOOKS:**


**THEORY OF METAL FORMING**

63
PART – A

UNIT – 1
07 Hours

UNIT – 2
06 Hours

UNIT – 3
06 Hours

UNIT – 4
07 Hours

PART – B

UNIT – 5
07 Hours
UNIT – 6
DRAWING OF RODS, WIRES AND TUBES: Drawing equipments and dies. Tandem drawing of wires. Analysis of rod or wire drawing and calculation of draw force and power required. Maximum possible reduction in drawing. Tube drawing using different types of mandrels, residual stresses and defect in drawn products. 07 Hours

UNIT – 7
SHEET METAL WORKING: Classification of sheet metal working and equipments used, Blanking and Piercing operation – Die design, cutting force required, slitting, trimming and shaving operations

Bending operation – Types of bending. Bend angle, bend radius, bend allowance and force required for bending. Springback effect in bending. Roll bending process. Brief description of spinning and stretch forming processes. 06 Hours

UNIT – 8
SHEET METAL DRAWING: Process, Die design, Number of draws required, Blank size calculation, and drawing force necessary. Drawability and defects in drawn products.

HIGH ENERGY RATE FORMING (HERF): Introduction to the process and brief description of Explosive forming, Electro discharge forming, and Electromagnetic forming. 06 Hours

TEXT BOOKS:
2. Fundamentals of Metal Forming Processes – Juneja B.L - New age International

REFERENCE BOOKS:
UNIT - 1

7 Hours

UNIT - 2
BASIC OF THEORY OF ELASTICITY: Definition of stress and strain, stress-strain relations; strain-displacement, Relations in 2D and 3D Cartesian and Polar coordinates.

6 Hours

UNIT – 3
CONTINUUM METHODS: Variational methods Raleigh-Ritz method applied to simple problems on axially loaded members cantilever. Simply supported and fixed beam with point loads and UDL Galerkin method as applied to simple elasticity problem.

7 Hours

UNIT - 4
FEM- BASIC DEFINITIONS: Displacement method, Nodal degrees of freedom, different coordinate systems shape functions. Lagrangian polynomial; complete formulation of bar-truss-beam-triangular-quadrilateral Tetrahedral hexahedral elements.

6 Hours

PART - B

UNIT - 5

7 Hours

UNIT - 6

7 Hours

UNIT - 7
DYNAMIC ANALYSIS: Formulating-element mass matrices for 1D and 2D element, computation of Eigen value and vector for simple one Dimensional analysis.  

6 Hours

UNIT - 8

6 Hours

TEXT BOOKS:


REFERENCE BOOKS:

PART – A

UNIT - 1
INTRODUCTION: Evolution of HRM, Objectives, Functions and Policies.

6 Hours

UNIT - 2
HUMAN RESOURCE PLANNING: Uses and benefits, Man Power Inventory, Man Power Forecasting, Methods of Man Power Forecasting, job Description, Job Specification

7 Hours

UNIT - 3
RECRUITMENT: Sources of Man power, Advertisement, Short Listing of Candidates calling Candidates for selection Process.

6 Hours

UNIT - 4
SELECTION: Selection procedure – Written Test, Group Discussion. Interview – Different methods, advantages and limitations, Psychological testing – Advantages and limitations, Induction procedure, transfers, promotion, exit interview, (Tutorial on written test, Group Discussion, Interviews)

7 Hours

PART - B

UNIT - 5

7 Hours

UNIT - 6
PERFORMANCE APPRAISAL: Components (all round performance appraisal), Methods. Advantages and limitations of different methods, Personal Counselling based on Annual Confidential Reports.

7 Hours

UNIT - 7
COUNSELLING AND HUMAN RESOURCE ACCOUNTING: Characteristics, Need, Function, Types, Suggestions for personnel development, communication function, communication process, effective communication. Human resource records, Advantages of HR accounting, Various methods of accounting.

6 Hours

68
UNIT - 8
INDUSTRIAL RELATIONS: Indian trade union act, standing orders act, Indian factories act,


6 Hours

TEXT BOOKS

REFERENCES BOOKS:
3. Human Resources Management – VSP Rao

ADVANCED MACHINING PROCESSES

69
**PART - A**

**UNIT - 1**

**INTRODUCTION:** History, Classification, Comparison between conventional and non-conventional machining process selection.


8 Hours

**UNIT - 2**

**ABRASIVE JET MACHINING (AJM):** Introduction, Equipment, Variables in AJM: carrier Gas Type of abrasive, Size of abrasive grain, velocity of the abrasive jet, Mean No. abrasive particles per unit volume of the carrier gas, Work material, stand off distance (SOD) nozzle design shape of cut. Process characteristics – Material removal rate, Nozzle wear, Accuracy & surface finish. Applications, Advantages & Disadvantages of AJM.

6 Hours

**UNIT - 3**

**ELECTROCHEMICAL AND CHEMICAL METAL REMOVAL PROCESS:** Electrochemical machining (ECM): Introduction, Study of ECM machine, Elements of ECM process: Cathode tool, Anode work piece, source of DC power, Electrolyte, Chemistry of the process ECM process characteristics – Material removal rate, Accuracy, Surface finish.

6 Hours

**UNIT - 4**

**ECM TOOLING:** ECM tooling technique 7 example, Tool &insulation materials, Tool size Electrolyte flow arrangement, Handling of slug., Economics of ECM, Applications such as Electrochemical turning, Electrochemical Grinding, Electrochemical Horning, deburring, Advantages, Limitations.

6 Hours

**PART - B**

70
UNIT - 5
CHEMICAL MACHINING (CHM): Introduction, Elements of process
Chemical blanking process :- Preparation of work piece. Preparation of
masters, masking with photo resists, etching for blanking, applications of
chemical blanking, chemical milling (Contour machining) :- Process steps –
masking, Etching, process characteristics of CHM :- material removal rate
accuracy, surface finish, Hydrogen embrittlement, Advantages & application
of CHM.

8 Hours

UNIT - 6
EDM PROCESS: Introduction, machine, mechanism of metal removal,
dielectric fluid, spark generator, EDM tools (electrodes) Electrode feed
control, Electrode manufacture, Electrode wear, EDM tool design : Choice of
matching operation, electrode material selection, under sizing and length of
electrode Machining time.

6 Hours

UNIT - 7
EDM PROCESS CHARACTERISTICS: Flushing – Pressure flushing
synchronized with electrode movement, EDM process characteristics: Metal
removal rate, Accuracy surface finish, Heat affected Zone. Machine tool
selection, Application: EDM accessories / applications, electrical discharge
grinding, Travelling wire EDM.

6 Hours

UNIT - 8
PLASMA ARC MACHINING (PAM): Introduction, equipment,
generation of plasma, Mechanism of Metal removal, PAM parameters,
Process characteristics.

LASER BEAM MACHINING & ION BEAM MACHINING:
Introduction, metal removal mechanism, advantages and application.

6 Hours

TEXT BOOKS:
1. Modern machining process - PANDEY AND SHAH - TATA Mc
2. Unconventional Manufacturing process – M K Singh, New age

REFERENCE BOOKS:
2. Thermal Metal cutting processes - B G Ranganath - I K
   International Publishing house Pvt. Ltd,
   K International Publishing house Pvt. Ltd.

VII SEMESTER
71
TOTAL QUALITY MANAGEMENT

Subject Code : 10IP/IM 71  IA Marks : 25
No. of Lecture Hrs./ Week : 04  Exam Hours : 03
Total No. of Lecture Hrs. : 52  Exam Marks : 100

PART - A

UNIT - 1
OVERVIEW OF TOTAL QUALITY MANAGEMENT: History of TQM. Axioms of TQM, contributions of Quality Gurus – Deming’s approach, Juran’s quality trilogy, Crosby and quality treatment, Imai’s Kaizen, Ishikawa’s company wide quality control, and Fegenbaum’s theory of TQC, QFD.

7 Hours

UNIT - 2
EVOLUTION OF QUALITY CONCEPTS AND METHODS: Quality concepts. Development of four fitnesses, evolution of methodology, evolution of company integration, quality of conformance versus quality of design from deviations to weaknesses to opportunities. Future fitness’s, four revolutions in management thinking, and four levels of practice

7 Hours

UNIT - 3
FOUR REVOLUTIONS IN MANAGEMENT THINKING: Customer focus, Continuous Improvement, Total participation, and Societal Networking. FOCUS ON CUSTOMERS; Change in work concept marketing, and customers.

6 Hours

UNIT - 4
CONTINUOUS IMPROVEMENT: Improvement as problem solving process; Management by process, WV model of continuous improvement, process control, process control and process improvement, process versus creativity. Reactive Improvement; Identifying the problem, standard steps and tools, seven steps case study, seven QC tools.

6 Hours

PART - B

UNIT - 5
PROACTIVE IMPROVEMENT: Management diagnosis of seven steps of reactive improvement. General guidelines for management diagnosis of a QI story, Discussion on case study for diagnosis of the seven steps. Proactive Improvement; Introduction to proactive improvement, standard steps for proactive improvement, semantics, example-customer visitation, Applying proactive improvement to develop new products- three stages and nine steps.

6 Hours
UNIT - 6
TOTAL PARTICIPATION: Teamwork skill. Dual function of work, teams and teamwork, principles for activating teamwork, creativity in team processes, Initiation strategies, CEO involvement Example strategies for TQM introduction. Infrastructure for mobilization. Goal setting (Vision/Mission), organization setting, training and education, promotional activities, diffusion of success stories, awards and incentives monitoring and diagnosis, phase-in, orientation phase, alignment phase, evolution of the parallel organization.

6 Hours

UNIT - 7
HOSHIN MANAGEMENT: Definition, phases in hoshin management-strategic planning (proactive), hoshin deployment, controlling with metiers (control), check and act (reactive). Hoshin management versus management by objective, hoshin management and conventional business planning, an alternative hoshin deployment system, hoshin management as “systems Engineering” for alignment.

6 Hours

UNIT - 8
SOCIOETAL NETWORKING: Networking and societal diffusion – Regional and nationwide networking, infrastructure for networking, openness with real cases, change agents, Center for quality Management case study, dynamics of a societal learning system. TQM as learning system, keeping pace with the need for skill, a TQM model for skill development, summary of skill development.

8 Hours

TEXT BOOKS:


REFERENCE BOOK:


OPERATIONS MANAGEMENT
PART - A

UNIT - 1
                                                                                                           6 Hours

UNIT - 2
OPERATIONS DECISION MAKING:
Introduction, Management as a science, Characteristics of decisions, Framework for decision making, Decision methodology, Decision support systems, Economic models, Statistical models.

SYSTEM DESIGN AND CAPACITY:
Introduction, Manufacturing and service systems, Design and systems capacity, Capacity planning.  
                                                                                                           7 Hours

UNIT - 3
FORECASTING DEMAND:
Forecasting objectives and uses, Forecasting variables, Opinion and Judgmental methods, Time series methods, Exponential smoothing, Regression and correlation methods, Application and control of forecasts.  
                                                                                                           7 Hours

UNIT - 4
AGGREGATE PLANNING AND MASTER SCHEDULING:
Introduction- planning and scheduling, Objectives of aggregate planning, Aggregate planning methods, Master scheduling objectives, Master scheduling methods.  
                                                                                                           6 Hours

PART - B

UNIT-5
MATERIAL AND CAPACITY REQUIREMENTS PLANNING:
Overview: MRP and CRP, MRP: Underlying concepts, System parameters, MRP logic, System refinements, Capacity management, CRP activities.  
                                                                                                           6 Hours
UNIT - 6
SCHEDULING AND CONTROLLING PRODUCTION ACTIVITIES:
Introduction, PAC, Objectives and Data requirements, Scheduling strategy and guidelines, Scheduling methodology, priority control, capacity control.

6 Hours

UNIT - 7
SINGLE MACHINE SCHEDULING: Concept, measures of performance, SPT rule, Weighted SPT rule, EDD rule, minimizing the number of tardy jobs.

FLOW-SHOP SCHEDULING: Introduction, Johnson’s rule for ‘n’ jobs on 2 and 3 machines, CDS heuristic.

JOB-SHOP SCHEDULING: Types of schedules, Heuristic procedure, scheduling 2 jobs on ‘m’ machines.

7 Hours

UNIT - 8
LEAN SYSTEMS: Characteristics of Just-in-Time operations, Pull method of materials flow, consistently high quality, small lot sizes, Uniform workstation loads, Standardized components and work methods, close supplier Ties, Flexible workforce, Line flows, Automated production, Preventive maintenance, continuous improvement, Kaizen.

7 Hours

TEXT BOOKS:
3. An introductory book on lean systems, TPS, Yasuhiro Monden

REFERENCE BOOKS:
3. Production and Operations Management – Adam & Ebert, PHI, 5th edition

FINANCIAL ACCOUNTING AND COSTING
PART - A

UNIT - 1

UNIT - 2
FINANCIAL STATEMENTS & ANALYSIS: Trial balance, preparation of Trading and Profit & Loss account, and Balance sheet.

UNIT - 3
RATIO ANALYSIS: Balance sheet ratio’s, profit – loss account ratio’s, and combined ratio’s.

UNIT - 4
COSTING: Objectives of costing, Elements of costing, methods of costing preparation of cost sheet (job costing)

PART - B

UNIT - 5
Process costing, Marginal costing and absorption costing.

UNIT - 6
STANDARD COSTING: Material, labour, overhead cost variance.
ACTIVITY BASED COSTING: Target Costing, Activity Based Costing and management

UNIT - 7
WORKING CAPITAL MANAGEMENT: Factors influencing working capital requirement, determination of operating cycle and working capital.

UNIT - 8
BUDGETING: Sales budget, production budget, raw materials purchasing budget, selling and administrative expense budget, cash budget, Flexible Budget & Master budget.
TEXT BOOKS:


REFERENCE BOOKS:

1. Elements of Accountancy - B.S Raman,
PART - A

UNIT - 1
FUNDAMENTALS OF INFORMATION SYSTEMS: Information systems in business, fundamentals of information systems solving business problems with information systems.
6 Hours

UNIT - 2
INFORMATION SYSTEMS FOR BUSINESS OPERATIONS: Business information systems, Transaction processing systems, management, information systems and decision support systems. Artificial intelligence technologies in business, information system for strategic applications and issues in information technology.
8 Hours

UNIT - 3
ISSUES IN MANAGING INFORMATION TECHNOLOGY: Managing information resources and technologies global information technology, management, planning and implementing change, integrating business change with IT, security and ethical challenges in managing IT, social challenges of information technology.
8 Hours

UNIT - 4
INTRODUCTION TO E-BUSINESS: E-commerce framework, Media convergence, Consumer applications, Organization applications.
6 Hours

PART - B

UNIT - 5
6 Hours

UNIT - 6
6 Hours

UNIT - 7
CONSUMER-ORIENTED E-COMMERCE: Consumer oriented
Application: Finance and Home Banking, Home shopping, Home
Entertainment, Mercantile Process Models, Consumers perspective, 
Merchants perspective.  

UNIT - 8  
ELECTRONIC DATA INTERCHANGE (EDI): EDI Concepts, 
Applications in business – components of international trade, Customs 
Financial EDI, Electronic fund transfer, Manufacturing using EDI, Digital 
Signatures and EDI. 

TEXT BOOKS: 
1. Management Information systems- Managing information technology 
    publishing company limited - 2002. 

REFERENCE BOOKS: 
1. Management Information systems- S. Sadogopan - PHI – 1998 Edn. - 

ENTERPRISE RESOURCE PLANNING LAB
PART - A
2. Generating Bill of Materials for Various Engineering Designs
3. Creating Item Master for various Engineering Designs
4. Conduction of vendor Evaluation exercise
5. Basic Statistical Analysis
6. Creating Purchase order for Items
7. Creating Work order for Items
8. Perform inventory transaction

PART - B
1. Creating quotation process for Items
2. Creating Dispatch Instruction for Items
3. Creating Payment reconciliation.
4. MRP - II Generating of Various reports for confirmed orders
5. Basic statistical analysis
6. Analyse of existing capacity and defining routes optimizing the resources along routes.
7. Optimization problems using OR packages (two exercises only).
8. Scheduling of activities

Suggested Software Packages
1. Statistical Packages : SYSTAT / MINITAB / SPSS and such others
2. ERP Packages: SIXTH SENSE / RAMCO / MAARSMAN / CIMAS / UNISOFT / OPTIMIZER 10.6 and such others.
3. Preactor – Scheduling Software OR Packages : Lindo / Lingo / STORM / such others

Note: A minimum of 12 exercises are to be conducted.

QUALITY ENGINEERING LAB
80
PART - A

To test the Goodness of fit for the given quality characteristic using: Uniform distribution, Binomial distribution, Poisson distribution & Normal distribution.

Conduction of Repeatability and Reproducibility studies for appraiser and instrument using R&R Software

Assessing Process Capability of the given manufacturing process using Normal Probability paper method and process capability indices

Assessing Process Capability of the given manufacturing process using Digital Motorized Multifunctional Height Gauge and SQC Display unit

PART – B

1. Experiments on Application of 7 QC Tools as applied to Manufacturing and Service Operations.
2. Construction of control chart for variable quality characteristic using
3. Digital Motorized Multifunctional Height Gauge
4. SQC Display unit
5. SQC/SPC software
6. Construction of control chart for attribute quality characteristic
7. Construction of control charts using SYSTAT Software
8. Attribute sampling Plans – Single, Double and Multiple sampling plans.
9. Experiments on correlation and Simple linear regressions
10. Experiments on multiple linear regressions
12. Exercises to demonstrate Taguchi’s Orthogonal Array technique through DOE software.
13. Exercises on FMEA and Reliability
14. Exercises on QFD

Note: A minimum of 12 exercisers are to be conducted

REFERENCE BOOKS:

ELECTIVE-II (GROUP B)
**PART - A**

**UNIT - 1**
**INTRODUCTION TO ERP:** Introduction, Evolution of ERP, What is ERP, Reasons for the growth of the ERP market, The advantages of ERP, Why do Man ERP Implementations Fail? Why are ERP packages being used now?

**ENTERPRISE – AN OVERVIEW:** Introduction, Integrated Management Information, Business modelling, Integrated Data Model.  
7 Hours

**UNIT - 2**
**ERP AND RELATED TECHNOLOGIES:** Introduction, Business Process Reengineering, Management Information System, Decision Support System, Executive Information Systems, Data Warehousing, Data Mining, On-line Analytical Processing, Supply Chain Management.  
7 Hours

**UNIT - 3**
**ERP- MANUFACTURING PERSPECTIVE:** Introduction, ERP, CAD/CAM, Materials Requirements Planning, Bill of Material, Closed Loop MRP, Manufacturing Resource Planning, Distribution Requirements Planning.  
6 Hours

**UNIT - 4**
**KANBAN:** JIT and Kanban, Product Data Management, Benefits of PDM, Make-to-order, and Make-to Stock, Assemble to order, Engineer to order, Configure-to order.  
6 Hours

**PART - B**

**UNIT - 5**
**ERP MODULES:** Introduction, Finance, Plant Maintenance, Quality Management, Materials Management.  
6 Hours

**UNIT - 6**

82
BENEFITS OF ERP: Introduction, Reduction of Lead time, On-time shipment, Reduction in Cycle Time, Improved Resource Utilisation, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Decision – making capability.

UNIT – 7

6 Hours

UNIT – 8

VENDOR, CONSULTANTS AND USERS: Introduction, In-house implementation – Pros and Cons, Vendors, Consultants, End-users.

FUTURE DIRECTION IN ERP: Introductions, New Markets, New Channels, Faster Implementation Methodologies, Business models and BAPIs, Convergence on Windows NT, Application Platforms, New business segments, web enabling, market snapshot

ERP- Case studies

8 Hours

TEXT BOOKS:


REFERENCE TEXT BOOK:


CONCURRENT ENGINEERING

83
PART - A

UNIT - 1
MANUFACTURING COMPETITIVENESS: Review, Product and Services, Process and Methodologies, performance, the need for change, Sequential versus concurrent Engg.

7 Hours

UNIT - 2
PROCESS REENGINEERING: Managing change, Reengineering approaches, Enterprise models, concurrent process reengineering.

7 Hours

UNIT - 3
CONCURRENT ENGINEERING: Introduction, Basic principles, components of CE models.

6 Hours

UNIT - 4
CONCURRENT ENGINEERING ORGANIZATIONS: Benefits, cooperative concurrent teams, Types of CE organisations.

6 Hours

PART - B

UNIT - 5
SYSTEM ENGINEERING: Introduction, System thinking, System complexity, System Integration, Angle virtual company.

6 Hours

UNIT - 6
INFORMATION MODELLING: Methodology, foundation of information modelling.

6 Hours

UNIT - 7
C. E. PROCESS: Concurrent engineering process invariant enterprise model class, product mode class, cognitive models.

6 Hours

UNIT - 8
CE METRICS FOR IT: Based manufacturing – process efficiency metrics, Process effectiveness metrics.

8 Hours
TEXT BOOK:


REFERENCE BOOKS:


MARKETING MANAGEMENT

85
PART - A

UNIT - 1
INTRODUCTION: Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, importance of marketing in the India Socio – economics system.

UNIT - 2
CONSUMER MARKETS AND BUYING BEHAVIOR: Characteristics affecting consumer behaviour, Types of buying decisions, Buying decision process, Classification of consumer products, Market segmentation.

UNIT - 3
MARKETING INFORMATION SYSTEMS AND RESEARCH: Components of marketing information system–benefits & uses marketing research system, marketing research procedure, measurement of market demand.

UNIT - 4
MARKETING OF INDUSTRIAL GOODS: Nature and importance of the Industrial market, classification of industrial products, participants in the industrial buying process, major factors influencing industrial buying behaviour, characteristics of industrial market demand. Determinants of industrial market demand Buying power of Industrial users, buying motives of Industrials users, the industrial buying process, buying patterns of industrial users

PART - B

UNIT - 5

UNIT - 6
BRANDING, LABELLING AND PACKAGING: Branding, Reasons for branding, functions of branding, features and types of brands, kinds of brand name.

LABELLING: Types, functions, advantages and disadvantages

PACKAGING: Meaning, growth of packaging, function of packaging, kinds of packaging.

6 Hours

UNIT - 7
PRICING: Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions.

6 Hours

DISTRIBUTION: Marketing channels – functions, types of channels of distribution, number of channel levels. Physical distribution – importance, total systems concept, strategy, use of physical distribution.

7 Hours

UNIT - 8

PERSONAL SELLING: Objectives of personal selling, establishing the Sales force objectives, sales – force strategy, sales force structure and size, salesmanship, qualities of good salesman, types of salesman, major steps in effective selling.

6 Hours

TEXT BOOKS:


REFERENCE BOOKS:


TECHNOLOGY MANAGEMENT
PART - A

UNIT - 1
THE CONCEPT OF TECHNOLOGY: Introduction, The nature of knowledge, Aspects of classification, Concept and Meaning of technology, The character of a specific technology, Scope of technology, Examples of classification of technology, Scale of technology information, Levels of technology, Technology portfolios, Technology as an environment.
6 Hours

UNIT - 2
7 Hours

UNIT - 3
THE ECONOMICS OF TECHNOLOGY: Introduction, Meaning of technological economics, Examples of technological economics, Scope of technological economics, Engineering economics, Production economics, Concept of economy of scale, Concept of optimum size, Technology as a commodity, Technology at the macro-economic level.
7 Hours

UNIT – 4
6 Hours

PART - B

UNIT - 5
ANALYSIS FOR TECHNOLOGY STRATEGY: Introduction, Technology assessment, Technology forecasting, Main techniques of technology forecasting, Technology forecasting system, Yield of technology forecasting.
7 Hours
UNIT - 6
THE REALIZATION OF NEW TECHNOLOGY: Introduction, Concept of R&D policy, Stimuli for innovation, Sources of innovation, Intelligence function of R&D, Management of R&D, R&D team, Effectiveness of R&D, Marketing aspects of R&D, Finance for Design, Development, Manufacture and Marketing, reduction of development lead time, Patterns for new technology development, Remaining a going concern.  

7 Hours

UNIT - 7

6 Hours

UNIT - 8
TECHNOLOGY- AN INSTRUMENT OF COMPETITION: Introduction, securing competitive advantage, Technological competition analysis, Technological leadership, Adoption of new technology, marketing a new technology product, Retention of competitive advantages.  

6 Hours

TEXT BOOK:

REFERENCE BOOKS:
3. Mastering the dynamics of innovation – J Utterback
Subject Code : 10IM 755  IA Marks : 25
No. of Lecture Hrs./ Week : 04  Exam Hours : 03
Total No. of Lecture Hrs. : 52  Exam Marks : 100

PART - A

UNIT - 1
DEFINITION AND CONCEPT OF ENTERPRISE: Profile of an entrepreneur-need scope and characteristics of entrepreneurs.  
6 Hours

UNIT - 2
DEFINITION AND CONCEPT OF ENTERPRISE: Attitude development, creativity–stress management-positive reinforcement.  
7 Hours

UNIT - 3
METHODOLOGY OF PROJECT IDENTIFICATION: Short listing and zeroing on to product/service-project in outline project planning- technical and feasibility analysis-evaluation of project report.  
6 Hours

UNIT - 4
METHODOLOGY OF PROJECT IDENTIFICATION: Project appraisal technical, commercial and financial appraisal - problems in project equation - legal, financial and environmental aspects.  
6 Hours

PART - B

UNIT - 5
MARKETING: Market share-distribution-sale strategies-certification agencies-term finance-source and management working capital-coating and cost control (basic principles only) need analysis-product design (basic principles only)- developing operational expertise- innovation and change.  
6 Hours

UNIT - 6
SMALL INDUSTRIES DEVELOPMENT: Small Industries development in India and its concepts- ancillary industries-starting a small scale industry-steps involved-role of financing and other institutions providing assistance to small industries- preparation of project (case study).  
7 Hours

UNIT - 7
ACCOUNTING PRINCIPLES: Conventions and concepts-balance sheet-profit and loss account.  
7 Hours

UNIT - 8
ACCOUNTING PRINCIPLES: Accounting rate of return, pay back period, SSI duty practice.  
7 Hours

TEXT BOOK:


REFERENCE BOOKS:

1. EDI - 1 Faculty and External Experts, A handbook for new entrepreneurs, Entrepreneurship development institute of India -1986.

ELECTIVE III (GROUP C)
FINANCIAL MANAGEMENT

Subject Code : 10IP/IM IA Marks : 25
761
No. of Lecture Hrs./ Week : 04 Exam Hours : 03
Total No. of Lecture Hrs. : 52 Exam Marks : 100

PART - A
UNIT - 1

RISK AND REQUIRED RETURN: Risk and return relationship, Business risk, financial risk, and risk in portfolio context, expected rate of return, Capital asset pricing model.
7 Hours

UNIT - 2

WORKING CAPITAL MANAGEMENT: Factors influencing working capital requirement, determination of operating cycle and working capital.
7 Hours

UNIT - 3
LONG TERM FINANCING: Raising of finance form primary and secondary markets, Valuation of securities, features of convertibility securities and warrants, SEBI guide lines on capital issues, stock market in India, Venture capital, Initial Public Offering.
7 Hours

UNIT - 4
CAPITAL STRUCTURE AND FIRM VALUE: Assumption, Definition and approaches, Modigliani and Miller Mode, Capital Structure decisions – EBIT, EPS analysis, ROI, REI analysis and Cash Flow comparative Analysis

DIVIDEND VALUE AND FIRM VALUE: Models, Reasons for payment of dividends, Dividend Policy, Bonus shares and stock splits, Dividend policies in practice.
6 Hours

PART - B
UNIT - 5
SECURITIES AND PORTFOLIO ANALYSIS: Derivatives, Futures Trading.
6 Hours
UNIT - 6
MERGER ACQUISITION AND RESTRUCTURING: Reasons, Mechanics, Cost and benefits of a merger, Evolution, terms and purchase of a division, Takeovers, Acquisitions, Portfolio and financial restructuring.

6 Hours

UNIT - 7

6 Hours

UNIT - 8
FINANCIAL MANAGEMENT IN SICK UNITS: Definition of sickness, Causes of sickness, Symptoms of sickness, Prediction of sickness, Revival of a sick unit

7 Hours

TEXT BOOKS:
2. Financial accounting - B.S. Raman - United publication – Vol - II

REFERENCE BOOKS:

93
PART - A

UNIT - 1
CONCEPTS OF PROJECT MANAGEMENT: Concepts of a Project, Categories of projects, Phases of project life cycle, Roles and responsibility of project leader, tools and techniques for project management.

6 Hours

UNIT - 2
PROJECT PLANNING AND ESTIMATING: Feasibility report, phased planning, Project planning steps, Objective and goals of the project, preparation of cost estimation, evaluation of the project profitability.

7 Hours

UNIT - 3
ORGANIZING AND STAFFING THE PROJECT TEAM: Skills / abilities required for project manager, Authorities and responsibilities of project manager, Project organization and types accountability in project execution, controls, tendering and selection of contractors.

7 Hours

UNIT - 4
PROJECT SCHEDULING: Project implementation scheduling, effective time management, different scheduling techniques, resources allocation method.

6 Hours

PART - B

UNIT - 5
TOOLS & TECHNIQUES OF PROJECT MANAGEMENT: Bar (GANTT) chart, bar chart for combined activities, logic diagrams and networks, Project evaluation and review Techniques (PERT) Planning, Computerized project management

7 Hours

UNIT - 6
CO-ORDINATION AND CONTROL: Project direction communication in a project, MIS project co-ordination, project control requirement for better control of project or role of MIS in project control, performance, control, schedule control, cost Control

7 Hours
UNIT - 7
PERFORMANCE MEASURES IN PROJECT MANAGEMENT:
Performance indicators, Performance improvement for the CM & DM companies for better project management, project management and environment, Software Project Management, Construction Project Management.

6 Hours

UNIT - 8
CASE STUDIES ON PROJECT MANAGEMENT: Over view of project management software, Case studies covering project planning, scheduling, use of tools & techniques, performance measurement.

6 Hours

TEXT BOOKS:

REFERENCES BOOKS:
3. Project Management with PERT and CPM - Moder Joseph and Philips cerel R.
PART - A

UNIT - 1
INTRODUCTION TO COMPOSITE MATERIALS: Definition, classification and characteristics of composite materials – fibrous composites, laminated composites, particulate composites. Properties and types of reinforcement and matrix materials.
6 Hours

UNIT - 2
7 Hours

UNIT - 3
FABRICATION OF COMPOSITES: Cutting, machining, drilling, mechanical fasteners and adhesive bonding, joining, computer aided design and manufacturing, tooling, fabrication equipment.
7 Hours

UNIT - 4
Ceramic Matrix composites and their fabrication technologies.
6 Hours

PART - B

UNIT - 5
Application of composites Characterisation of composites, computer aided design and analysis of composites
7 Hours

UNIT - 6
Application of industrial experimentation for fabrication and testing of composites
6 Hours

UNIT - 7
STUDY PROPERTIES OF MMC’S: Physical Mechanical, wear, machinability and other properties. Effect of size, shape and distribution of particulate on properties.
6 Hours

96
UNIT - 8
Advanced composites such as Polymer based Sandwich structures of nano composites.  5 Hours

Introduction to shape memory alloys.  2 Hours

TEXT BOOKS:

REFERENCE BOOKS:
PART - A

UNIT - 1
INTRODUCTION TO WORLD CLASS MANUFACTURING:
Manufacturing Excellence and Competitiveness, What is world-Class Manufacturing?-Hall’s framework of world-Class Manufacturing (WCM), Gunn’s Model of World-Class Manufacturing, Maskell’s Model of World-Class Manufacturing, America’s Best Plants Model of World Class Manufacturing.

6 Hours

UNIT - 2
WORLD CLASS MANUFACTURING: The philosophy of world-class Manufacturing-The First Principles of World-Class Manufacturing, The practices of World-Class Manufacturing-The customers Interface, The Supplier Interface, World-Class Practices in the factory, Quality Management, Shingo’s.

7 Hours

UNIT - 3
PRINCIPLES AND PRACTICES OF WCM: Data collection plan, research-internal public domain sources, outside experts etc. original research, site visits, and code of conduct. Analyzing the gap: Top displaying data, deciding and combining best work practices, Balance Score Card Technique, Value Stream Mapping, validation, recommendations etc

6 Hours

UNIT - 4
BENCHMARKING:
Definition, mission and objectives, managing benchmarking process, training and code of conduct, future scope and benchmarking process. What to benchmark: concept of step zero, priorities, business processes – linking to goals etc, investigation, documentation, performance measures, improving business processes. Whom to benchmarks: Developing candidate list, systematic search, refining the initial list.

7 Hours

PART - B

UNIT - 5
DEFINITION OF REENGINEERING: Importance of 3Cs-customers takes charges, competition intensifies, and change becomes constant. Definition of Business Process Reengineering – fundamentals rethinking, radical redesign, and dramatic improvement.

6 Hours

UNIT - 6
Rethinking business process, new world of and enabling role of information technology.

QUALITY MANAGEMENT SYSTEMS:
ISO 9000-2000, IS 14000, Frame Work for Business Excellence - Malcolm Baldrige Award, Deming’s Award 7 Hours

UNIT - 7
SIX SIGMA: The Basics, The core of Six Sigma(DMAIC), design for Six Sigma, DFSS and the customer, Quality time and the Bottom line, core of DFSS-IDOV method, DFSS Metrics, DFSS Infrastructure —People and resources, Implementing DFSS 7 Hours

UNIT - 8
ACTIVITY BASED MANAGEMENT (ABM):
Introduction, Traditional Cost Systems, Activity Based activity Based Costing, Activity Based Management, ABM Implementation, Case Study. 5 Hours

Introduction to Theory Of Constraints (TOC)

TEXT BOOKS:

REFERENCE BOOKS:

COMBINATORIAL OPTIMIZATION
PART – A

UNIT - 1
6 Hours

UNIT - 2
6 Hours

UNIT - 3
Review of graphs and network, review of computational complexity
6 Hours

UNIT - 4
Spanning Trees
6 Hours

PART - B

UNIT - 5
Shortest Path Algorithm, Minimum Cost Network Flows, Maximum Flow Algorithm
7 Hours

UNIT - 6
MATCHING ALGORITHM: Travelling Salesmen Problem, Postman Problems, Machine Scheduling Problem.
7 Hours

UNIT - 7
META HEURISTICS: Simulated Annealing, Tabu Search
7 Hours

UNIT - 8
7 Hours
TEXT BOOKS:


REFERENCE BOOKS


VIII SEMESTER

101
PART - A

UNIT - 1

7 Hours

UNIT - 2

6 Hours

UNIT - 3

6 Hours

UNIT - 4

7 Hours

PART - B

UNIT - 5
SOURCING, TRANSPORTATION AND PRICING PRODUCTS: Role of sourcing, supplier – scoring & assessment, selection and contracts. Design collaboration.

6 Hours
UNIT - 6

7 Hours

UNIT - 7
COORDINATION AND TECHNOLOGY IN THE SUPPLY CHAIN: Co-ordination in a supply chain: Bullwhip effect, Obstacles to coordination. Managerial levers to achieve co-ordination, Building strategic partnerships.

6 Hours

UNIT - 8

4 Hours

EMERGING CONCEPTS: Reverse Logistics, Reasons, Activities, Role. RFID Systems; Components, applications, implementation. Lean supply chains, Implementation of Six Sigma in Supply Chains.

3 Hours

SUGGESTED TEXT BOOK:


REFERENCE BOOKS:

4. Supply Chain and Logistics Management – Upendra Kachuru

FACILITIES PLANNING AND DESIGN
PART - A

UNIT - 1
PLANT LOCATION: Factors influencing plant location, Theories of plant location and location economics. Plant layout-Objectives of plant layout, Principles of plant layout, types of plant layout, their merits and demerits, facilities design function: Objectives, Types of Layout Problems.

7 Hours

UNIT - 2
MATERIAL HANDLING: Objectives and principles of Material handling, Unit load concept, classification of material handling equipment based systems, different types of material handling equipments

6 Hours

UNIT - 3
PLANT DESIGN: Layout procedures: Immer, Nadler, Muther, Apple James and Reed’s approaches, systematic layout planning, activity relationship chart, relationship diagram, Space relationship diagram to plant layout

7 Hours

UNIT - 4
COMPUTERIZED LAYOUT PLANNING: CRAFT, COFAD, PLANET, CORELAP, ALDEP

6 Hours

PART - B

UNIT - 5
SPACE DETERMINATION AND AREA ALLOCATION: Factors for consideration in space planning, receiving, storage, production, shipping, tool room and tool crib, other auxiliary service actions, Establishing total space requirement, area allocation factors to be considered, expansion, flexibility, aisles column, area allocation procedure, the plot plan. Sequence demand, Straight line and non directional methods

7 Hours

UNIT - 6
CONSTRUCTION OF THE LAYOUT: Methods of constructing the layout, evaluation of layout, efficiency indices, presenting layout to management

3 Hours

LOCATION MODELS: Single and Multi facility location models, Location allocation problems – quadratic assignment problems.
UNIT - 7
QUANTITATIVE APPROACHES TO FACILITIES PLANNING:
Deterministic models, single and multi facility location models, Location allocation problems – quadratic assignment problem, Warehouse layout models, plant location problems.

UNIT - 8
LAYOUT MODELS: Warehouse Layout Models, Waiting line models, Storage models – simple problems, Evaluation, selection and implementation of facilities plan

TEXT BOOKS:

REFERENCE BOOKS:
ORGANIZATIONAL BEHAVIOUR

Subject Code : 10IP/IM 831  IA Marks : 25
No. of Lecture Hrs./ Week : 04  Exam Hours : 03
Total No. of Lecture Hrs. : 52  Exam Marks : 100

PART - A

UNIT - 1
INTRODUCTION: Definition of Organisation Behaviour and Historical development, Environmental context (Information Technology and Globalization, Diversity and Ethics, Design and Cultural, Reward Systems).

4 Hours

THE INDIVIDUAL: Foundation of individual behaviour, Ability

2 Hours

UNIT - 2
LEARNING: Definition, Theories of Learning, Individual Decision Making, classical conditioning, operant conditioning, social making, learning theory, continuous and intermittent reinforcement.

6 Hours

UNIT - 3
PERCEPTION: Definition, Factors influencing perception, attribution theory, selective perception, projection, stereotyping, Halo effect.

6 Hours

UNIT - 4
VALUES AND ATTITUDES: Definition – values, Attitudes: Types of values, job satisfaction, job involvement, professional Ethics, Organizational commitment, cognitive dissonance.

6 Hours

PART - B

UNIT - 5
MOTIVATION: Maslow’s Hierarchy of Needs, Mc. Gregor’s theory X and Y, Herzberg’s motivation Hygiene theory, David Mc Cleland three needs theory, Victor Vroom’s expectancy theory of motivation.

7 Hours

UNIT - 6
THE GROUP: Definition and classification of groups, Factors affecting group formation, stages of group development, Norms, Hawthorne studies, group processes, group tasks, group decision making. CONFLICT MANAGEMENT: Definition of conflict, functional and disfunctional conflict, stages of conflict process.

7 Hours

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UNIT - 7

8 Hours

UNIT - 8
THE ORGANIZATION: Mechanistic and Organic structures, Mintzberg’s basic elements of organization, Organizational Desings and Employee behaviour, organization development – quality of work life (QWL), Team building.  

6 Hours

TEXT BOOKS:

2. Organizational Behaviour – Schermerhorn - Wiley India Pvt Ltd - 9th Edn.

REFERENCE BOOKS:

PART - A

UNIT - 1

6 Hours

UNIT - 2

8 Hours

UNIT - 3
KNOWLEDGE MANAGEMENT – AN INSIGHT: Knowledge Management – Evolution, why now, Limitation of Existing initiatives, value of knowledge, Minimize effort duplication, sharing of best practices, enhanced innovation, imperatives, Organizational knowledge management – The need, key benefits, key benefits parameters, Organizational benefits, core implementation areas, organizational performance, implementation responsibilities, core groups involved, organization barriers, key elements, Organizational knowledge management.

6 Hours

UNIT - 4
KNOWLEDGE MANAGEMENT – AN INSIGHT: The Drivers, Knowledge based driver, technology drivers, Intra – organizational drivers, process drivers, economic drivers, Knowledge Management – Future, Global knowledge economy – characteristics of the knowledge economy, policy implications, business implications, What is knowledge Management, Organizational Knowledge Management Approaches – management structure, funding, Organizational culture and enablers, Technology

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infrastructure, Organizational knowledge management strategies, Components and function, Learning organization – Knowledge sources, focus on products and processes, Documentation, knowledge dissemination, Organisational learning, value-chaining, skill development.

6 Hours

PART - B

UNIT - 5

6 Hours

UNIT - 6
KNOWLEDGE MANAGEMENT TECHNIQUES, SYSTEMS AND TOOLS: Introduction, Organizational Knowledge creation – Knowledge networks, Organizational knowledge mapping techniques, core implementation issues, usage, Organizational knowledge spiral, Organizational Knowledge / capture – Implementation methodology, Knowledge Acquisition Tools, Organizational Knowledge indexing, processing, Document Management System, Database Management Systems Data warehouse, Knowledge Analysis – Data mining, On-line analytical processing, Organizational knowledge dissemination.

6 Hours

UNIT - 7
actionable phase, implementation phase, Support phase, Organizational deployment, Organisational knowledge Measurement Techniques – Intangible Assets measurement, intangible Assets Monitor, balanced Scorecard, organizational implementation barriers.

8 Hours

UNIT - 8
K-CAREERS: Introduction, Knowledge Management roles, New organizational roles, Organisational k-role classification, Knowledge management job opportunities – knowledge job approach, generic role requirements, role description, Knowledge architect, Knowledge strategist, Knowledge manager, Research analyst / manager, knowledge management consultant, media specialist, senior market intelligence librarian, ontologies / knowledge engineer, knowledge management specialist, intranet developer / knowledge management content developer, knowledge management director, director of ontologies, ontologist (biological domain), natural language processing specialist (medical/biomedical), knowledge development manager.

6 Hours

TEXT BOOK:


REFERENCE BOOK:


DESIGN OF EXPERIMENTS

110
PART - A

UNIT - 1

6 Hours

UNIT - 2
BASIC DESIGNS: Completely Randomised Design, Randomised Block Design, Latin Square Designs, one way analysis of variance and two way analysis of variance.

6 Hours

UNIT - 3

6 Hours

UNIT - 4
FACTORIAL EXPERIMENTATION-EIGHT AND SIXTEEN RUN EXPERIMENTS: Fractional factorial designs based on eight-run experiments, folding over an eight run and sixteen – run experiment

6 Hours

PART - B

UNIT - 5

7 Hours

UNIT - 6
STEPS IN ROBUST DESIGN: Case study discussion. Noise factors and testing conditions. Quality characteristics and objective functions. Control factors and their levels. Matrix experiment and data analysis plan. Conducting the matrix experiment, data analysis, verification experiment and future plan.

7 Hours

UNIT - 7

111
**SIGNAL-TO-NOISE RATIO FOR STATIC PROBLEMS:** Evaluation of sensitivity to noise. S/N ratios for Smaller-the-better, Larger-the-better, Nominal-the-best and Asymmetric Cases

7 Hours

**UNIT 8**

**SIGNAL-TO-NOISE RATIO FOR DYNAMIC PROBLEMS:** S/N ratios for Continuous-continuous, continuous-digital, digital-continuous, digital-digital cases. Introduction to Taguchi Inner and Outer Arrays

7 Hours

**TEXTBOOKS:**


**REFERENCE BOOK:**

ADVANCED OPERATIONS RESEARCH

Subject Code : 10IP/IM 834 IA Marks : 25
No. of Lecture Hrs / Week : 04 Exam Hours : 03
Total No. of Lecture Hrs. : 52 Exam Marks : 100

PART - A

UNIT - 1
LINEAR PROGRAMMING: Two phase simplex method, Revised simplex algorithm and its applications. 6 Hours

UNIT - 2
ADVANCED LINEAR PROGRAMMING: Sensitivity analysis, Integer Programming – graphical technique and Gomory’s technique. 7 Hours

UNIT - 3
SPECIAL TYPE OF LPP: Solutions of Assignment and Travelling salesman problems using Branch and Bound Approach.

GOAL PROGRAMMING: Introduction and simple formulation. 6 Hours

UNIT - 4
NON-LINEAR PROGRAMMING: Kuhn – Tucker conditions, QPP - solution using Wolfes algorithm 6 Hours

PART - B

UNIT - 5
DYNAMIC PROGRAMMING: Characteristics and DP model, Computational procedure - Simple problems only 6 Hours

UNIT - 6
ADVANCED CPM TECHNIQUES: CPM - Elements of crashing, least cost project scheduling. Flow in networks; Determination of shortest route, Determination of Maximum flow through the networks, Minimal Spanning Tree. Resource Allocation for optimal utilisation of resources 8 Hours

UNIT - 7
QUEING THEORY: M/Ek/1, M/D/1, M/M/C and MG1 6 Hours

UNIT - 8

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7 Hours

TEXT BOOKS:


REFERENCE BOOKS:

DATA BASE MANAGEMENT SYSTEM

Subject Code : 10IP/IM 835  IA Marks : 25
No. of Lecture Hrs./ Week : 04  Exam Hours : 03
Total No. of Lecture Hrs. : 52  Exam Marks : 100

PART - A

UNIT - 1
DATABASES AND DATABASE USERS: Introduction, characteristics of
data base approach, intended uses of a DBMS, advantages and implication of
database approach.

2 Hours

DATABASE SYSTEMS CONCEPTS AND ARCHITECTURE: Data
models, Schemas and instances, DBMS architecture and data independence,
database languages and interfaces, database system environment,
classification of data base management systems.

5 Hours

UNIT - 2
DATA MODELING: High level conceptual data models for database
design. Entity types, entity sets, attributes, and keys. Relationships,
relationship types, roles and structural constraints. Weak entity types. ER
diagrams

6 Hours

UNIT - 3
RECORD STORAGE AND PRIMARY FILE ORGANIZATION:
Secondary storage devices, buffering of blocks, placing file records on disk,
operations on files, heap files and sorted files, hashing techniques.

6 Hours

UNIT - 4
INDEX STRUCTURE OF FILES: Single-level and multilevel ordered
indexes, dynamic multi level indices using B-trees and B+ trees.

6 Hours

PART - B

UNIT - 5
RELATIONAL DATA MODEL AND RELATIONAL ALGEBRA: Brief
discussion on Codd rules, relational model concepts, constraints and
schemas. Update operation on relations, basic and additional relational
algebra operations and queries in relational algebra.

Structured Query Language (SQL): Data definition in SQL2. Basic and
complex queries in SQL. Insert, delete, update statements, and views in SQL,
embedded SQL.

9 Hours
UNIT - 6
DATABASE DESIGN: Design guidelines for relational schemes, functional Dependencies, normalization - 1st, 2nd, 3rd, 4th, and 5th normal forms. Database design process, factors influencing physical database design guidelines and guidelines for relational systems.

6 Hours

UNIT - 7
SYSTEM IMPLEMENTATION: System catalog for RDBMS, transaction processing and system concepts, properties of transactions, brief discussion on concurrency, control and recovery techniques, database security and authorization.

6 Hours

UNIT - 8
BRIEF DISCUSSION ON: Distributed databases, Objected oriented databases, next generation databases and interfacing with other technologies.

6 Hours

TEXT BOOKS:


REFERENCE BOOKS:

PART - A

UNIT - 1
6 Hours

UNIT - 2
STRATEGY FORMULATION: Strategic Thinking, SWOT analysis- Techniques for environmental analysis- TOWS matrix, Balanced Score Card, Steps in strategy implementation -formulation of SBU strategy.  
6 Hours

UNIT - 3
STRATEGY FORMULATION: Leadership implementation communicating the strategy- Annual and Functional objectives- Development of policies- Organisational Implementation- Evaluation and control. reward system.  
7 Hours

UNIT - 4
6 Hours

PART - B

UNIT - 5
STRATEGY EVALUATION AND CONTROL: Strategic control- Premise and Implementation control strategic Surveillance special alert control- Operational control- Steps in Operational Control, Types of Operational control.  
7 Hours

UNIT - 6
PORTFOLIO STRATEGY: Business portfolio analysis- BGC matrix, GE multi matrix, an evaluation of Portfolio models - factors influencing portfolio strategy.  
6 Hours

UNIT - 7

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COMPETITIVE ANALYSIS AND STRATEGIES: Structural analysis of industries threat of entry rivalry among existing competitors, threat of substitutes; Bargaining power of suppliers; structural analysis and competitive strategy - competitor analysis value chain.

UNIT - 8

GLOBALIZATION: Meaning and Dimensions, Globalization of Indian business, Barriers to change, Implementation of marketing and change.

TEXT BOOKS:
1. Strategic Management - Francis Cherunilam - Himalya Publishers,

REFERENCE BOOKS:
ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

Subject Code : 10IP/M841  IA Marks : 25
No. of Lecture Hrs./ Week : 04  Exam Hours : 03
Total No. of Lecture Hrs. : 52  Exam Marks : 100

PART - A

UNIT - 1
ARTIFICIAL INTELLIGENCE: Introduction, definition, underlying assumption, important of AI, AI & related fields State space representations, defining a problem, production systems and its characteristic, search and control strategies – Introduction, preliminary concepts, examples of Search problems.

6 Hours

UNIT - 2
UNIFORMED OR PRELIMINARY CONCEPTS: Examples of search problems, Uniformed or Blind Search, Informed Search, Or Graphs, Heuristic Search techniques – Generate and Test, Hill climbing, best first search, problem reduction, constraint satisfaction, Means – Ends Analysis.

8 Hours

UNIT - 3
KNOWLEDGE REPRESENTATION ISSUES: Representations and Mapping, Approaches, Issues in Kr, Types of Knowledge procedural Vs Declarative, Logic programming, Forward Vs Backward reasoning, Matching, Non monotonic reasoning and it logic.

6 Hours

UNIT - 4
USE OF PREDICATE LOGIC: Representing simple facts, Instance and is a relationships, Syntax and Semantics for Propositional logic, FOPL, and properties of Wffs, conversion to causal form, Resolution, Natural deduction

6 Hours

PART - B

UNIT - 5
STATISTICAL AND PROBABILISTIC REASONING: Symbolic reasoning under uncertainly, Probability and Bayes’ theorem, Certainty factors and Rule based systems, Bayesian Networks, Dempster – Shafer Theory, Fuzzy Logic

8 Hours
UNIT - 6

6 Hours

UNIT - 7
INTRODUCTION TO KNOWLEDGE ACUQISTION: Types of learning, General learning model, and performance measures.

6 Hours

UNIT - 8
TYPICAL EXPERT SYSTEMS: MYCIN, Variants of MYCIN, PROSPECTOR, DENDRAL, PUFF etc.

INTRODUCTION TO MACHINE LEARNING: Perceptrons, Checker Playing examples, Learning, Automata, Genetic Algorithms, Intelligent Editors.

6 Hours

TEXT BOOKS:


JUST IN TIME MANUFACTURING
120
PART – A

UNIT - 1
JIT – AN INTRODUCTION: Speed of JIT movement, the new production system research association of Japan, some definitions of JIT, core Japanese practices of JIT, creating continuous manufacture, enabling JIT to occur, basic element of JIT, benefits of JIT.

6 Hours

UNIT - 2
MODERN PRODUCTION SYSTEM: Key feature of Toyota’s production system, basic framework of Toyota production system. KANBAN SYSTEM – other types of kanban’s, kanban rules, adapting to fluctuations in demand through kanban, whirligig, determining the number of kanban’s in Toyota production system, detailed kanban system example, supplier kanban and the sequence schedule for use by suppliers.

6 Hours

UNIT - 3
PRODUCTION SMOOTHING IN TOYOTA PRODUCTION SYSTEM: production planning, production smoothing, adaptability to demand fluctuations, sequencing method for the mixed model assembly line to realize smoothed production, Criticism of Toyota production system by the communist party of Japan. EDP system for support of the Toyota Production system. Shortening lead time in Toyota Production system – reducing the setup time. Automation in Toyota production system, some comparisons with other manufacturers.

6 Hours

UNIT - 4
GLOBAL IMPLEMENTATION OF JIT: JIT in automotive industry, JIT in electronics, computer, telecommunication and instrumentation, JIT in process type industry, JIT in seasonal demand industry, other manufacturing industries, JIT in service and administrative operations, conclusion.

6 Hours

PART - B

UNIT - 5
JIT IMPLEMENTATION SURVEYS: JIT implementation in US manufacturing firms-analysis of survey results, just in time manufacturing industries, just in time production in West Germany, just in time production in Hong Kong electronics indu8stry, conclusion.

6 Hours
UNIT - 6
DESIGN, DEVELOPMENT AND MANAGEMENT OF JIT MANUFACTURING SYSTEMS: plant configurations and flow analysis for JIT manufacturing, comparison of JIT’s “demand pull” system with conventional “push type” planning and control systems, quality management system for JIT, product design for JIT human resource management in JIT, flexible workforce system at Toyota, creation and maintenance of teams for JIT, union organization and conduct of industrial relations in JIT, interface of JIT with advanced manufacturing technology, assessing performance in JIT manufacturing systems, product costing information systems in JIT manufacturing, an example of overhead allocation in JIT, potential for developing countries, potential for small manufacturing.

9 Hours

UNIT - 7
SUPPLY MANAGEMENT FOR JIT: JIT purchasing-the Japanese way, some studies in JIT purchasing, experience of implementation organizations, surveys of JIT purchasing, buyer-seller relationship in JIT purchasing, Quality certification of suppliers in JIT purchasing, some problems in implementation of JIT purchasing, reduction freight costs in JIT purchasing, monitoring supplier performance for JIT purchasing, audit in JIT purchasing, implementation of JIT to international sourcing, frequency of shipments, inventory policy, supplier reaction capability, quality, communication sole sourcing, delivery performance and supplier flexibility, conclusion.

7 Hours

UNIT - 8
FRAMEWORK FOR IMPLEMENTATION OF JIT: Implementation risk, risks Due to inappropriate understanding of JIT, risks due to technical, operational and people problems, risks associated with kanban system, some important activities to be performed during implementation, steps in implementation, a project work to approach to implementation, conclusion.

6 Hours

TEXT BOOKS:

PART - A

UNIT - 1
INTRODUCTION: Definition of Automation, Reasons for Automation, Arguments for and against Automation, Manufacturing industries, Types of Productions, Functions in Manufacturing, Organization & Information processing in Manufacturing.  

UNIT - 2
PRODUCTION CONCEPTS & MATHEMATICAL MODELS:

UNIT - 3
PRODUCTION COST ANALYSIS METHODS OF EVALUATING INVESTMENT ALTERNATIVES: Costs in Manufacturing, Break-even Analysis, Unit Cost of Production, Cost of Manufacturing Lead Time & Work-in-process, Other Difficult-to-quantify Factors.

UNIT - 4

PART - B

UNIT - 5

UNIT - 6

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7Hours

UNIT - 7

6 Hours

UNIT - 8
AUTOMATED INSPECTION AND TESTING: Statistical quality control, Automated inspection principles & methods, Sensor technologies for automated inspection, Co-ordinate measuring machines, other contact inspection methods, Machine vision, Optical inspection methods, Non-Contact inspection methods.

6 Hours

TEXT BOOKS:


REFERENCE BOOKS:

PART - A

UNIT - 1  
DECISION SUPPORT SYSTEMS: An Overview, Opening Vignette: Evaluating the Quality of Journals in Hong Kong, DSS Configuration, What is a DSS? Characteristics and Capabilities, Components of DSS, The Data Management Subsystem.

6 Hours

UNIT - 2  

7 Hours

UNIT - 3  

6 Hours

UNIT - 4  
DATA WAREHOUSING, ACCESS, ANALYSIS, MINING AND VISUALIZATION: Database management Systems in DSS, Database Organization and Structures, Data Warehousing, OLAP: Data Access, Querying and Analysis, Data Mining, Data Visualization and Multidimensionality, Geographic Information Systems and Virtual Reality, business Intelligence and the Web.

7 Hours

PART - B

UNIT - 5  

6 Hours

UNIT - 6

7 Hours

UNIT - 7

6 Hours

UNIT - 8

7 Hours

TEXT BOOK:


RELIABILITY ENGINEERING
PART - A

UNIT - 1
INTRODUCTION: Concepts, terms, and definitions of reliability and related performance measure, Terminology in reliability, Failure rate, MTBF, Life test, importance of reliability, definition, meaning of adequate performance, reliability-engineering Programme and its scope, Typical applications.

UNIT - 2
RELIABILITY MANAGEMENT: Reliability goals & policies, economics of reliability, reliability data Collection.

COMPONENT LIFE: Failure distribution function, reliability function and hazard rate function, interrelationships, MTTF, MTBF, bath tub curve (Mortality curve), conditional reliability function, constant and time dependant failure models.

PRACTICAL FAILURE PATTERNS: Failure behaviour of mechanical, electrical, electronic parts, common failure distribution.

UNIT - 3
COMBINATORIAL RELIABILITY (RELIABILITY OF SYSTEMS): Reliability analysis of systems: (Success-Failure models only) Analysis of Series, parallel, series parallel and parallel series configurations. R out of n configurations, redundancy improvement factor, stand by systems.

UNIT - 4
TECHNIQUES FOR COMPLEX SYSTEMS RELIABILITY EVALUATION: Inspection methods, event space methods, path tracing methods, decomposition methods, cut set methods, tie set methods.

PART - B

UNIT - 5
DESIGN FOR RELIABILITY: System effectiveness measures and life cycle cost analysis, reliability allocation, methods for reliability in design, failure analysis, systems safety and fault tree analysis, multistate model, Failure mode effect and criticality analysis.
MARKOV MODELS FOR SYSTEM RELIABILITY: Reliability analysis of state dependent systems, Markov analysis, stand by system analysis, Load sharing systems.

6 Hours

UNIT - 7
MAINTENABILITY AND AVAILABILITY: Analysis of Down time, Repair Time distributions, maintainability, Maintenance increment, Design for maintainability. Availability analysis, Different forms of availability, system availability analysis, mission availability, Availability of stand by system.

6 Hours

UNIT - 8
ANALYSIS FAILURE DATA: Types of life testing, data collection, Empirical methods, Estimation of Static life, types of life testing: Development of confidence intervals, acceptance test procedures for life estimation using exponential, weibull and Gamma distribution models. Sequential life tests and acceptance criteria.

APPLICATION AND CASE STUDIES: Case example involving redundancy, burning tests, preventive maintenance analysis. Repairable system analysis, Software reliability.

8 Hours

TEXT BOOKS:

REFERENCES BOOKS:
1. Reliability Hand Book – Ireson and Grant -1995
PART - A

UNIT - 1
OVERVIEW AND CONCEPTS: Need for Data Warehousing, Basic Elements of Data Warehousing, Trends in Data Warehousing.

PLANNING AND REQUIREMENTS:
Project planning and management, collecting the requirements.

7 Hours

UNIT - 2
ARCHITECTURE AND INFRASTRUCTURE: Architectural components, Infrastructure and metadata.

6 Hours

UNIT - 3
DATA DESIGN AND DATA REPRESENTATION: Principles of dimensional modeling. Dimensional modelling advanced topics, data extraction, transformation and loading, data quality.

8 Hours

UNIT - 4
INFORMATION ACCESS AND DELIVERY: Matching information to classes of users, OLAP in data warehouse, Data warehousing and web.

IMPLEMENTATION AND MAINTENANCE
Physical design process, data warehouse deployment, growth and maintenance.

7 Hours

DATA MINING

PART - B

UNIT - 5
INTRODUCTION: Basics of data mining, related concepts, Data mining techniques.

6 Hours

UNIT - 6
DATA MINING ALGORITHMS: Classification, Clustering.

6 Hours

UNIT - 7
DATA MINING ALGORITHMS: Association rules.  

UNIT - 8
KNOWLEDGE DISCOVERY: KDD process.

WEB MINING
Web content mining, Web structure mining and Web usage mining.  

TEXT BOOKS:
1. Data Warehousing Fundamentals - Paulraj Ponnian, John Wiley.- 1st edition
3. Data mining concepts and techniques - Han, Kamber - 2nd edition

REFERENCES BOOKS: